Amateur Photographer's Hand Book.

J. Aldrich Saunders.
Jamestown,
R.I.

THE

AMATEUR PHOTOGRAPHER'S

HAND BOOK.

A MANUAL OF INSTRUCTION FOR THE AMATEUR.

PHOTOGRAPHY MADE EASY.

BY ARTHUR HOPE.

AUTHOR OF "SORRENTO AND INLAID WORK," "WOOD CARVING,"
"ENGRAVING ON WOOD," ETC.

CHICAGO:
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PREFACE.

Although this book cannot be called an invention, yet necessity is its mother; it is needed by beginners, by amateurs and by many who make the art a business. And this, after all, may be only another way of alluding to "a long felt want." It is only a little book, yet it embodies the result of a "powerful amount" of work and experiment.

When the author was beguiled into buying a camera many years ago, he could find nothing in print which explained clearly the various operations. There were numerous instruction books, but they omitted the explanations which were of vital importance to the beginner. Therefore he was compelled to grope in the dark, experimenting continually, and often uselessly, wasting precious time—not to mention dollars—which he could ill afford to lose. The instruction books misled him, as they do to-day, and chemicals were wasted because the formulas were wrongly given. "Dissolve one ounce of pyro in sixteen ounces water." He did so, and after four-fifths of the solution had grown black and valueless, he learned that it was not wise to dissolve more pyro than was to be used immediately. To make blue paper, the

directions were to dissolve about two ounces citrate iron and ammonia in eight ounces of water, and combine with the other chemical. He did this and made some tolerable prints; the second time the solution was used, the prints were intolerable; and finally the solution was poured in the sink. Again, it took some time to learn that the iron and ammonia would not keep fresh in solution, and should be dissolved in a small quantity and used fresh. And so it was with many other things.

The book is incomplete; it is not possible to describe every process in detail in a space so limited; yet it is hoped it will be a help to all.

Acknowledgements are due to the Scovill & Adams Co. and Messrs E. & H. T. Anthony & Co., who have kindly loaned their cuts.

ARTHUR HOPE.

CHICAGO, MARCH, 1890.

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CHAPTER I.

THE OUTFIT.

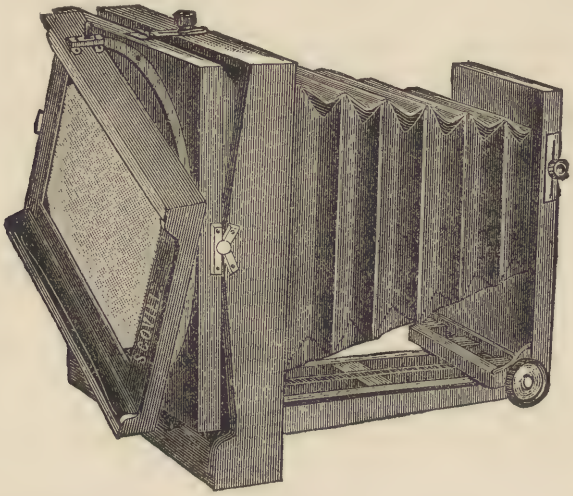
WHAT kind of a camera shall I purchase? This is a question most perplexing to one unacquainted with the art of photography, and is usually answered by the advice to get the best the means of the purchaser will permit. We do not think, however, that this would be a wise plan to pursue, unless one has the determination to succeed, and aims to produce the highest class of work. While this should be the aim of all who use the camera, the majority of amateurs take up photography more as a temporary amusement, and to those our advice would be to get an outfit of moderate price. If, after using this for a season, one is encouraged by reasonable success, he will then be in a better position to decide what his requirements are, and can make further investments accordingly.

It must not be supposed that because a camera is low in price, the work which it will do is correspondingly low in quality. We have seen excellent views made with a camera and lens costing only twelve dollars, and very fair small views made with an outfit costing half that sum.

We do not think it wise to recommend any particular make of camera, as, where nearly all in the market have certain good points about them, it would be indelicate to advise the purchase of one in preference to another. Possibly, if we manufactured a particular style of camera, we should advise all to purchase that

kind, and such advice might mislead as to the merits of different goods made by our competitors. We have our preferences, and think the camera we use is quite ahead of anything else; but our friend across the way has another which he prefers, and his experience is quite equal to our own.

A front-focus camera, in which the focus is obtained by moving the front, bearing the lens, forward or back, is by many preferred to one with a back-focus, which requires moving the back to focus on the object.



The camera should also have a sliding front and a swing-back; and, if the highest degree of excellence is desired, a double swing, a side swing, and revolving or reversible back, the uses of which will be explained hereafter.

The above illustration shows a front-focus camera with sliding front, revolving back, and double swing.

5x7 and 5x8 cameras are convenient portable sizes, which will, by use of kits in the plate-holders, take as well all smaller sized views. We use for landscape work both a 5x8 and an 8x10 camera, and on both a lens capable of covering an 8x10 plate. A 4x5 view taken with such a lens can be enlarged to 8x10 or 16x20 with perfect clearness. (See Chapter on Enlarging.)

If only one lens is purchased it is better to get one covering an angle of from 60 to 65 degrees. Such a lens will answer for all ordinary purposes. The first camera the writer purchased was a 5x8, the cost of which, including the lens and tripod, was twelve dollars. This was found to be excellent for landscapes and portraits. Later, for the purpose of taking interiors, it became necessary to add a wide-angle lens, covering a field of about ninety degrees, and finally the old camera was replaced by a 5x8 and an 8x10, with double and side swings, and revolving backs. If stereoscopic lenses are wanted, we think that cheap ones, costing from seven to ten dollars for the pair, do practically as good work as those costing three or four times as much.

We prefer altogether for landscape work a lens of long focus; for a 5x8 plate a lens of at least eight inches focus, and, for an 8x10, one of twelve or thirteen inches. For very near views a lens with shorter focus and wider angle is suitable; but if this is used on objects at a considerable distance it has the effect of crowding too much into the picture. Wide-angle lenses are required for views of interiors.

There are multitudes of lenses in market, of excellent quality, Dallmeyer, Steinheil, Morrison, Darlot, and a score of others,

and the amateur may be at a loss to know which to procure. We think he will be quite safe to take the advice of a conscientious dealer in the selection of a good lens as well as of the camera itself. We like our imported "Strauss" lens, because it does fine work and was comparatively inexpensive, though it is not, by any means, the best that is made; nor can we see that it is any better than the one in our detective camera, which costs less.

The tripod should be strongly made, to hold the camera steady when used, as it sometimes will be, where the wind blows. A tripod that can be raised or lowered, and folded in small space for carrying, is the most convenient for use.

Usually a double plate-holder comes with the camera. It will be well to purchase two or three extra holders, with kits for holding plates of a smaller size, so that a number of pictures can be taken, without the necessity of returning to the dark-room to empty and refill the holder each time it is used.

A pneumatic shutter, one that will work slowly for time exposures, and rapidly for instantaneous views, will be indispensable if a fine camera is purchased. Such a shutter renders it easy to make exposures of a second or fraction of a second, which cannot be done accurately by removing and replacing the lens cap. Besides this it avoids all danger of jarring the camera in exposing. As pneumatic shutters are now made at a comparatively low price and of excellent quality, we should advise their use on all cameras.

In addition to the camera, lens and tripod, not forgetting the very essential focusing-cloth, one or more dozen dry plates of the proper size should be purchased at the outset. Do not buy very rapid plates until you have had some experience in making

exposures. Quick plates require a greater degree of accuracy in the time of exposure than slow ones, and are usually not as easy to develop. There are numerous makes of dry plates, and, as far as we have been able to test them, they are all of good quality. Nearly all plate-makers prepare plates of different sensitometers, or degrees of rapidity. It would be a very great convenience to photographers if all plate-makers used one standard scale for marking the rapidity of their plates. As they do not pursue this course, we have thought it not amiss to give here the sensitometers of the plates made by some of the leading manufacturers.

CARBUTT PLATES.

These are made of all degrees of rapidity, from 10 Warnerke's sensitometer to 27, the "Eclipse" plate. Mr. Carbutt says that there is no quicker plate made than his "Eclipse," and that any brand bearing a higher number is no criterion of comparative rapidity. His lantern-slide plates are sens. 10; "A" gelatine-albumen plates for transparencies and reproduction of negatives, sens. 10, 11, 12 and 13; "B" plates for landscape and general photography, sens. 16, 17, 18 and 20; "Special" plates, sens. 24 and 25, for portraits and instantaneous views; "Eclipse," sens. 27, also for portraits, instantaneous views and flash lights; Orthochromatic plates, to give correct color values, sens. 20 to 25, for landscapes and interiors.

SEED PLATES.

Sensitometers, 22, 23, 25, 26 and 26 X. "The sensitometer number on our plates indicates the rapidity. The higher the

number, the quicker the plate. The difference between one number and the other is twenty-five per cent; so if one number requires two seconds, the next one higher would require one and a half seconds, and so with each successive number."

CRAMER PLATES.

Ordinary sensitometers run from thirty to sixty, though they sometimes make as slow as fifteen. "We have adhered to the old system of numbering our plates, which is to compare the sensitiveness of them with a collodion wet plate. Thus a fifteen sens. plate will require the fifteenth part of the exposure of a wet plate, etc. When trying to ascertain the sensitiveness of a plate, we compare it with one whose sensitiveness we know, (our standard twenty-five sens.), and by long practice we are enabled to come within a point or two. Most plate-makers use the Warnerke sensitometer, but since they cannot be relied on we think we will have to stick to our old plan and wait for the advent of the standard light.

"We make plates as slow as fifteen sens., but there is comparatively little demand for plates slower than thirty. Most of the plates we send out are forty to sixty. Higher numbers are difficult to work, and we do not encourage photographers to use them.

EASTMAN PLATES.

The "Peerless" plates, made by the Eastman Co., are made in all sensitometers from 28 to 35 Warnerke. Their lantern-slide plates, called "Permanent Bromide Transparency," are about 8

sensitometer. They also make all standard sizes of transparency plates up to 10x12 with backs of ground glass.

Besides these glass-plates this company also makes a large line of bromide paper, transparent films and transferotype paper, which are for sale by all dealers.

HARVARD PLATES.

"We manufacture but one grade of plate, sens. 40. This is sensitive enough for general portrait work, and is particularly successful for landscape work."

CHICAGO PLATES.

are made in all sensitometers from 20 to 30. 20 to 22 are for slow exposures; 22 to 26 are medium to quick; and 27 to 30 for instantaneous.

CHAPTER II.

FIRST EXPOSURES.

"WELL, boys, we have a bright Saturday morning at last, and I am glad you have brought your new cameras along so that we can start at once to take the promised photographs."

"Haven't filled your plate-holders yet? Well, you had better run up into my dark-room and fill them there."

"O, you never have filled any before? Well, then I will go with you and show you just how the thing is done."

"Now, before we go into the dark-room, we will just look over the things and see what plates and plate-holders we have with us. So you have three boxes of plates with you, two boxes of 5x8 and one box 4x5; and I notice they are all very quick plates, that is, plates which require a very short exposure. I do not think it would be well for you to use these quick plates at first, because it is so much more difficult to judge with any accuracy the time that would be required for the exposure. If you use slow plates and strike the time within one or two seconds, your picture will probably be a success as far as the exposure is concerned. But if you use a very quick plate and expose it for one or two seconds too long, or too short a time, the result may be disastrous. So for this first effort your holders had better be filled with some slow plates, which I will give you."

"Now, first, let us look at the plate-holders. We pull out a slide and notice that the two sides are of different colors, one being light and the other dark. One object of this is to show which side of the plate-holder has the plate which has been exposed. When we fill the holders we always put the slides in with the light side out, which will show us that that side of the holder contains a plate to be exposed. Afterwards, when we come to make the exposure, and for that purpose withdraw the slide, we reverse the slide on returning it, so that the dark side will be on the outside; and whenever we see one of the holders with the dark side of the slide out, we shall understand that it contains either a plate that has been exposed, or no plate at all. These plate-holders are new and have never been used, and, therefore, we do not hesitate to open them here in the light; but after you have used them a while it will be safer never to open them outside of the dark-room."

"Now you notice this box of plates. When we get into the dark-room we will take a knife and cut this paper all around which binds the cover to the box. Before doing this, however, we will look once more at our plate-holders and see if they are free from dust, which is one of the enemies the photographer always has to contend with. A little dust in the plate-holder might settle on the plate and trouble us hereafter, so we will remove the slides, and with a soft brush dust out the inside of the holders as carefully as we can."

"Now let us take the holders and our boxes of plates and go into the dark-room; we shut the door carefully behind us so as to exclude every portion of light from without. If you will examine you will see that the light is entirely kept out, not a ray

coming into the room from under or around the door or from any other part of the room. The exclusion of all white light is a very important matter, as we shall see hereafter. We light the gas in our dark-lantern and turn it down rather low, so that we are just able to read the printing on the boxes of plates, which we place under the lantern where the developing is usually done. We now proceed to open a box of plates which, for our experiments to-day, are the slow landscape plates made by Mr. Carbutt, sensitometer 16. We remove the cover and find the plates in the box are contained in two packages. As we only wish to use four plates of this size, 5x8, we open the upper package which contains six plates. The upper plate is placed film side down; we can see the difference in the two sides plainly when we hold the plate under the dark-lantern, the film side having a dull, waxy appearance, while the other side reflects the light like clear glass. If there is any doubt about the matter as to which is the film side, we can always tell by scratching in one of the corners with a penknife. Before we place this plate in the holder we carefully brush it with our soft camel's-hair brush, to remove any particles of dust which may have settled on the plate. *This is very important; remember always to do it.* Then we place it in the plate-holder with the film side out, the side which is to receive the picture. This plate, when we took it from the package, was film side down, and we notice that the next plate is film side up, so we see that the two upper plates were packed with their film surfaces facing each other, separated by narrow strips of cardboard. This is the way that all plates are packed, each pair of plates having their sensitive surfaces together. Knowing this, when later on you may find it necessary to fill any number of

plate-holders at one time, you will find that you can get along just as well in perfect darkness as to use your dark-lantern, because you will know when you take a plate from the box which is the film side. We now put the other plates in the plate-holders, including two 4x5 slow plates, for the small camera."

"Before starting out it will be well to scratch a figure or a letter on each side of the plate-holders, so that we can describe or number the holder when we enter it in our record book. This record book is indispensable, and no one should think of taking a photograph without a book of the kind, which we will now describe:

"The most convenient size is a blank book as large as can conveniently be carried in the pocket—say a book about three inches wide and six inches long. We first make a narrow column on the left, and write down in this the Nos. 1, 2, 3, 4, 5, etc., to the bottom of the page. These numbers will be the numbers of our negatives, and the corresponding numbers will be pasted on the corner of the negative after development. A second narrow column will contain the numbers or the letters of the plate-holders, as A, B, C, D, etc. The third column which should be wider than the last, will contain sizes of the plates and the kind of plates used, as for instance, in this case, 5x8 Carbutt B. The next narrow column will be to record the time given for the exposure—the number of seconds. The next column will give the size of the stop or diaphragm used in the lens; the next, the time of day and the condition of the atmosphere, whether bright or cloudy. Then a broad column on the right-hand page will give space to write down the

subject, and after that the date on which the exposure was made. This will give a complete record of all the exposures made, and will be a book of very great value. We will make these entries in our book now."

"Now, as we do not propose to go very far this time, you had better put your cameras together, that is to say, set them up here and leave behind the cases they came in. In setting them up be very careful when you fasten the camera to the tripod to see that it is screwed tight, so that there is no possibility of its coming loose while carrying it. The three plate-holders which you have I shall be glad to carry in this bag, as it is the only thing I take with me. So let us start along and have a short ramble along the river road, where we will probably find something worthy of our cameras."

Willie, who has the best camera, is impatient to make his first trial, and hurries on ahead. Turning a bend in the road after a few minutes' walk, we come upon him with his camera planted in the road in front of the little country church, with its pretty steeple. He is endeavoring to get the focus, but it does not work to suit him. He had his eyes too close to the ground-glass, and was trying to look through it at the view. Then, when he moved his head back and found that the picture showed on the glass, he was bothered because everything showed upside down. This is a little perplexing at first, but we soon get accustomed to it. We criticize first the manner in which he has set his tripod. One of the legs was pointed directly backward. We arrange this so that one of the legs is directly in front, while the other two are placed one on each side.

"Now you see there is no danger of tripping over that leg or

upsetting the camera while you are arranging the focus; also you will see that to raise the front of the camera or lower the back in order to level it, you simply use the forward leg as a sort of pivot while you raise the others from the ground, taking one in each hand, near the upper part."

Finally he succeeds in getting his focus, which he obtains by moving the front part of the camera, which bears the lens, back or forward until the picture shows with distinctness upon the ground-glass. Still he is not satisfied. He has his focus all right, but he finds that he is not able to see the top of the steeple. He is trying to take this picture of a high building across the narrow side of his plate. Now his is a reversible swing-back camera, and his 5x8 plate is placed horizontally in the camera, so we reverse the ground-glass by turning it one-fourth around which makes it stand perpendicular to its former position. This allows him to see on the ground-glass more of the steeple than he could before, but still the top is not in view. We notice that the front of the camera, which carries the lens, moves up and down. We, therefore, loosen the thumb-screw and raise the front, and with it the lens, and we find on looking again at the picture on the ground-glass, that we have now the whole of the church in view. Raising this front has cut off some of the foreground, which we did not need, and has enabled us to take in the extreme top of the steeple. We could, however, have accomplished this result in a different way. Instead of raising the front, which we now replace, we set back the forward leg of the tripod, which has the effect of tilting the camera up, and on looking at the ground-glass again we find that by pointing the camera up we take in the whole of the church steeple as we did before;

but we notice, however, another queer thing. The sides of the church, instead of being perpendicular as they should be, seem to lean inward as if they would come to a point if extended. Of course, this would give us an absurd representation of the building if we should photograph it in that way, and to correct this we have recourse to the swing-back of the camera. When we tilted the camera, we noticed that the ground-glass, which before had been perpendicular, was inclined backward. We loosen the thumb-screw which holds the swing-back and incline the upper part of the back forward, keeping our eyes on the picture on the ground-glass as we do this. As the glass is inclined forward we notice that the perpendicular lines of the building gradually become erect, and when they seem to be perfectly true and parallel to each other we tighten the thumb-screw to hold the back in that position. We notice now in looking at the back of the camera that, while the forward part of the camera is tilted up, the back of the camera carrying the ground glass is perpendicular. We make a note of this, which we shall find afterwards of great use in taking other photographs of buildings or in copying pictures; that is, that for such work the ground-glass, which occupies the place of the plate, should be parallel to the surface which we wish to copy. This is one of the uses of the swing-back of the camera; other uses of that as well as of the side-swing we shall refer to later.

We have now to decide upon the stop or diaphragm to use in the lens. We will not here discuss the different uses of the stops, leaving that for a subsequent chapter, and will select a stop which is marked f 32, which in this case, as the focus of the lens is eight inches, is a stop measuring a quarter of an inch in diameter. We

insert the stop, put the cap upon the lens and the plate-holder in its place all ready to draw the slide and make the exposure. Before making the real exposure, however, we shall practice a little on counting the time and on taking off the cap.

"Now will each one of you please take off the cap and count the time, and at the end of the time replace the cap as neatly and carefully as you can. We will say that the time that we are going to give to the exposure is six seconds. Now let the first one try."

"Well, you made the mistakes that are usually made in these operations. You removed the cap gently, which was all right, but after you had taken it from the lens you held it for nearly a second directly in front of the lens and then gradually lowered it. Of course, while the cap was in front of the lens it obscured so much of the landscape and delayed the exposure. Again, your time instead of being six seconds was only three seconds. Now let the next boy try."

"That was a little better in one respect and worse in another. You came nearer to the time, your exposure was five seconds, but you were too hasty in removing the cap and you shook the camera perceptibly. Now if the building of which you were taking a picture should shake a little like that it would not make much difference, as long as it did not shake the plate. But when you shake the camera, and with it the plate, that blurs the picture on the plate beyond redemption. We will now let the other boy try and see how well he performs these two operations."

"That was very much better; the cap was taken off gently but firmly, and as soon as removed it was brought down out of sight without jarring the camera in the slightest. But you have counted your time too slow, and instead of six seconds you have made it

twelve seconds. Two of you counted the time and one of you guessed, and none of you were right. Of course, you could use a watch with which to count your time, but you would not always get it exact in that way, especially if you wanted one or two seconds, as part of the time would go by after you removed the cap until you could notice the face of your watch. We have, however, one very reliable way of counting seconds or parts of seconds. Suppose we wanted six seconds. We commence to say the moment the cap is off the lens, 'one-thousand one, one-thousand two, one-thousand three, one-thousand four, one-thousand five, one-thousand six.' Just as we say the six we replace the cap on the lens. Suppose we wanted two and one-half seconds, then we would say, 'one-thousand one, one-thousand two, one-thou'— and cap the lens. Counting in that way, you will have no difficulty in counting any time from one-half second to a minute. It is something you need to remember."

"Now we are all ready to take the picture, and we lay the focusing cloth over the camera so that it covers every thing but the lens; we draw the slide, the front slide of our plate-holder, removing it entirely from the holder, keeping the camera at the same time covered with the focusing cloth. Then we look to see that the camera is perfectly still, and, removing the cap, count our time, and the exposure is made; the cap being replaced at the end of the time. Now remember about the slide of the plate-holder when we replace it, we must have the dark side out, which will show us that there is an exposed plate in that side of the plate-holder; also when we put it in the holder we must be careful to put it in squarely, not one corner at a time, but to put it in so that the whole end of the slide will at the same time enter the

slit of the holder. If not done in this way, light will be likely to get in the holder and fog the plate. When we get back to our dark-room and have emptied a plate-holder you can hold one of them up to the light and see how the insertion of one corner of the slide in the slit opens the shutter along the whole width so that you can see the light plainly through it."

Our young friend here removes the plate-holder which he places carefully in the box holding the others, and proceeds with his camera to walk on and take other views.

"Wait a moment, there is something and a very important thing which you have forgotten. Your plate-holder will show on which side is the exposed plate, but suppose you go on now and take another picture and then, as you have this time, put the plate-holder away without making a memorandum, how shall you be able to tell on which side is either particular plate or exposure which you have made?"

"Yes, you see you have forgotten to make the proper entry in your note book, which we will now proceed to do as follows: This was plate-holder B in your note book, therefore, opposite that letter, you mark now in the proper column the time, six seconds; in the next column the size of the stop, f32; the next column we will write 10:30 B, which will stand for bright; then the subject, the church by the river, and the date.

While we are making these minutes in the note book the two younger boys had gone ahead with their cameras. When we overtook them we found them both focusing on a very pretty little cottage under the trees. They had both selected a good position, but were having some difficulty in deciding upon the proper object to get their focus upon. One had focused upon

the trunk of a tree which stood about half way between himself, and the cottage, though a little off to one side. He had chosen this to focus upon because the sun was shining upon it, and it looked so clear on his ground-glass. The cottage itself was very much out of focus, and it was very indistinct and somewhat blurred. As the cottage was the principal part of the picture he readily saw that that should be the object to show the most distinctly upon the ground-glass. The other boy had focused correctly upon the cottage, but did not notice that his camera was not level, so that in the picture the cottage seemed to be sliding down hill. This is one of the first points always to be noticed, that the camera must be level so that the line of the horizon as shown upon the ground-glass may be level. Both of the boys had to use their sliding fronts so as to bring into their pictures the tops of the trees which were close to the cottage. They decided to use the same size of stop as that which they had just seen used before.

"Now our first picture, the one of the church, which was out in the bright sunlight, was made with an exposure of six seconds, but in this case we are taking a picture of a house of a light drab color, under and shaded by trees. The shadows of these trees, you will notice, fall across the roof of the house and also nearly cover one side. From this view there will be very much less light thrown into the camera than from the previous one, and therefore we must give it longer time. We cannot tell the exact time to give for a view of this kind. It would not be easy for any one to tell the exact time required for any particular kind of plate. There are no exact rules to give in determining correctly the time required for different views. We have to learn this by

experience, keeping a careful record of every exposure and giving all the particulars, and before you are aware of it you will learn accurately about the correct time to give for every exposure. The time of the year, the time of day and the state of the atmosphere, all of these govern the time for exposing the plate.

In October, November and December, January, February and March, the quantity of the light is very much less than in the other six months of the year, the greatest amount of light being, of course, at the time of the year when the sun is the highest in the sky. As these are comparatively slow plates which we are using, we shall try to give them enough and aim rather to give a little longer time than we think may be necessary, rather than to run the risk of giving too short a time. If the exposure is too short no amount of developing will bring out a picture on the plate when there is none there; but if the time is a little too long we are able by care in developing to bring out a picture all right. In this case, therefore, suppose we make the time 12 seconds, which would certainly not be at all too long if we were aiming to make a picture simply of the shadows alone. There is an old saying, which is growing to be an adage in photography, 'Expose for the shadows and let the lights take care of themselves.' It is a good rule to follow."

"Now, do not forget to cover your camera carefully with your focusing cloth before you draw the slide from the plate-holder. It may be that your plate-holder is so tight and fits so closely to the camera that no light can possibly get between them, but there is danger of the plate-holder or camera warping a little, or a little dust or dirt getting in to prevent the two fitting

together closely and thus leaving a space for the light to get in, so it is always safer to cover the camera with your focusing cloth and avoid the risk of the light fogging your plates."

"Now you are all ready; be sure to count your time carefully."

"That was right, you gave the time just right and you were very careful about replacing the caps on the lenses. Before you replace the slide remember about putting it squarely into the plate-holder and with the dark side out."

"O, one of you forgot to take out the slide, so of course, you have no picture on the plate and you will have to try yours over again."

While he is getting ready to make the exposure again, Henry, who has the 4x5 camera, has taken out his plate-holder and placed it in his focusing cloth, and goes across the road, where he sits down under the deep shadow of some bushes. Pretty soon he comes back, and says that there must be something the matter with his camera as he had just looked at the plate and there was not the slightest sign of a picture on it. He had made two mistakes. He supposed that exposing the plate for a picture made some change in the appearance of the plate, and he also supposed that he could look at this plate in the shade without danger of injuring it. The plate which has been exposed for a picture does not differ in appearance from a plate which has not been exposed; the picture on the plate is only brought out afterwards by the development. And the moment he drew the slide to examine the plate in the shade, that very moment the light fogged his plate. The plate can only be looked at in the dark room by the aid of a dark lantern. We mean, of course,

a plate which has not been developed. This is not the first time that we have seen this mistake made, as once before we came across a young man attempting to fill his plate-holders under the shade of some low-branched trees. He filled his plate-holders, of course, but with plates which he had ruined in so doing.

So once more Henry puts his plate holder in the camera, and makes another exposure of the same view. It was such a pretty view that he wanted to use it for his first one.

CHAPTER III.

CHEMICALS.

BEFORE proceeding to develop the first plates a few words on chemicals will not be out of place. The chemicals which we should recommend for the beginner are:

Sulphite soda crystals, one lb.
Carbonate soda crystals, pure, one or two lbs.
Powdered borax, one-half lb.
Hyposulphite soda, five or ten lbs.
Bromide potassium, one oz.
H. & F. hydrochinon, one oz.
Carbonate potash, one-half lb.
Phosphate soda, one-half lb.
Caustic soda sticks, one oz.
One lb. concentrated ammonia.
Chloride gold and sodium, 30 grain vial.
Nitric acid, C. P., one lb.
Nitrate silver crystals, one oz.
Ferricyanide potassium, two ozs. (Red prussiate of potash).
Citrate iron and ammonia, 2 ozs.
Chloride ammonium, 4 ozs.
Meta bisulphite potash, one oz.
Bisulphite soda, 4 ozs.
Yellow prussiate potash, 4 ozs.

The above are all the chemicals that will be required in developing, fixing and toning, and in making blue and silver printing paper. To these might be added, as the beginner will wish to try developing with that, one oz. pyrogallic acid.

All of the above, with the exception of hyposulphite soda, should be either "pure" or "chemically pure," which is usually designated on packages as C. P. He should also procure about one-half dozen 16 oz. bottles with glass stoppers; one-half dozen ½ gall. bottles with rubber corks; one gallon bottle for hypo.

Some scales that will weigh grains.

The sulphite soda crystals, as well as the ammonia, should be kept in a cool and dry place, and tightly corked, as they both deteriorate unless carefully preserved. The ammonia bottle must have a glass stopper.

He will also need certainly one glass graduate, a four ounce, and it will be a great convenience to have also a number of other sizes, a minim holding sixty drops, or one dram, a one ounce, two ounces, and either an eight or a sixteen ounce. These are marked in drams and ounces, eight drams to the ounce.

Also, one or more glass trays of the proper size for developing the plates, and one or two japanned trays for fixing. Small trays for 4x5 plates will always be found convenient, as requiring less solution for developing plates of that size or smaller.

It will be a great convenience and save much time if the above bottles are graduated as soon as they have been washed clean. To graduate them, take a strip of white paper about one-half inch wide and paste it on the side of the bottle reaching from the bottom to the top. When this is dry (we will say that it is a gallon bottle for the fixer hypo.) pour into the bottle 8 ounces

of water, and when it is perfectly still mark the level of the water on the paper with a pencil and against that mark 8 ounces; then pour in another eight ounces, and mark that level, and so on until the bottle is filled. The marks on the paper from bottom to the top read 8, 16, 24, and so on to 128 ounces, or more, if the bottle holds a little over a gallon. The advantage of thus marking the bottles will be seen when we prepare our solution of hyposulphite soda in this bottle. In place of using the strip of paper, the markings may be laid directly on the glass with black varnish, applied with a fine-pointed brush. This has the advantage over paper that it will not wash off. All of the smaller bottles should be marked in the same way, marking a 16 ounce bottle in ounces.

Weigh out two pounds hyposulphite soda, and one ounce bisulphite soda, and pour it into the graduated gallon bottle; then pour fresh water into the bottle until it rises to the 96 ounce mark. This when dissolved will give a solution of hypo. in the proportion of one ounce hypo. to three ounces water. This is stronger than is usually used for a fixer, and should be reduced when wanted, taking one part hypo. and one part water, which reduces it for the fixer to the proportion of one to six. The bisulphite of soda is added to keep the solution clear while in use.

As there are generally plenty of old bottles around a house, it will be a good plan to take one or two holding a quart, and after thoroughly cleaning them, fill them half full with the above hypo. solution, filtering it as described at the close of this chapter, and then filling the bottles with water. These bottles should then be labeled:

Hypo. filtered for use.

We will now proceed to make stock solutions of our different chemicals. First we will make our solution of sulphite soda: We take 1200 grains of the crystals and put them in one of our 16 oz. bottle, adding water to make 15 oz. We will label this on the outside:

Stock solution.
Sulphite soda crystals.
One dram equals ten grains.

As there are 1200 grains contained in the 15 oz., which are equal to 120 drams, of course one dram will contain exactly 10 grains. Then we take our carbonate soda crystals, weigh out 1200 grains and put them in a 16 oz. bottle, to which we add water to make 15 oz. and label this:

Stock solution.
Carbonate soda crystals.
One dram equals ten grains.

We do the same with our carbonate potash, making a solution of 1200 grains to 15 oz. water, one dram of which will equal 10 grains. We also do the same with our phosphate soda. It will be well also to purchase about one dozen common 4 oz. bottles with corks, which will be convenient for holding small quantities of different solutions that will not be needed in large quantities. In one of the 4 oz. bottles place 20 grains bromide potassium and add water to equal 10 drams and mark this, ½ dram equals one grain. In using bromide of potassium, which is used very largely as a restrainer in development, it is essential that the solution should always be fresh and for that reason only a small quantity should be prepared at a time. The writer makes it a

point never to prepare more of the bromide solution than is required for use in a few days. It has been found that bromide potassium solution rapidly deteriorates, and if it has been kept sometime it has no effect as a restrainer. With the above stock solutions the amateur will be able to prepare fresh nearly all the ordinary developers, using hydrochinon or pyrogallic acid at a moment's notice, the hydrochinon and pyro being added dry. For example the following is a standard pyro developer greatly used by professional photographers.

No. 1.

Pyrogallic acid, 1 oz.
Sulphite soda crystals, 4 oz.; (437½ grains to the ounce.)
Water to make 32 oz.

No. 2.

Carbonate soda crystals, 4 oz.
Water to make 32 oz.

Of this use equal parts Nos. 1 and 2. Now, suppose we require a four ounce developing solution for a 5x8 plate: to make this we should take two ounces each of the above Nos. 1 and 2, and we wish to ascertain exactly how many grains of each of the above chemicals there are in our four ounces of mixed solution. To ascertain this is very simple. We see that in taking two ounces of No. 1, we take 1-16 of the No. 1, which will contain 1-16 ounce of pyro that equals 27½ grains, 4-16 ounces sulphite soda, that equals 109 grains; and of the No 2, 4-16 ounces carbonate soda, equals 109 grains. Now if the amateur should want to prepare the above developer, it would not be economical for him to prepare it as described by the formula. One ounce pyrogallic acid

would lose much of its strength long before he had time to use the quantity dissolved. Pyrogallic acid always acts better in the developer when perfectly fresh, and the only way to have it perfectly fresh is to mix it when wanted. Now as we know the quantity of each chemical used in our four ounce solution, we can prepare it perfectly fresh in this way. We need 109 grains sulphite soda, so we take down our stock solution and pour into our graduate 11 drams, which we know to contain 110 grains, (this is near enough to 109.) We also pour into the same graduate 11 drams of the carbonate soda crystals solution, giving us 110 grains of that, to which we add water to make the whole up to four ounces. We now carefully weigh out 27½ grains of pyro, which, on being poured into the graduate, is instantly dissolved, and the developing solution is ready for use. This formula which we have given above as an illustration, is very strong in pyro, and it would be better for the amateur to weaken it with an equal quantity of water if he wishes to use it for developing plates.

To return once more to our stock solutions. After they have been entirely dissolved they should be filtered. To filter our bottle of sulphite soda we will take another large, clean bottle and place our funnel in it, then take a small wad of fine cotton wool and wet thoroughly under the tap, until it is wet all through, then press this cotton into the bottom of the funnel and slowly pour upon it the contents of our stock bottle. This should filter through slowly, and after it is all filtered, the solution should be returned to the original stock bottle, which has been previously thoroughly cleaned. In the same way the other solutions should be filtered. Of course the same cotton must not be used for filtering any other substance, and the funnel should be very

clean before being used on any other chemical. One caution must be observed throughout: the hyposulphite soda must be kept apart from all other chemicals, and no bottle that has contained any hypo. should ever be used for any other purpose.

In regard to filtering through cotton wool, we have known many who had trouble in getting the cotton wet enough to let the solution filter through easily. We use just enough cotton to be held in the neck of the funnel and stay there without being forced through; to wet it, we lay it on the fingers of one hand, patting it with the other hand, while the water is running on it; then transfer it, upside down, to the other hand, and wet and pat the other side. This gets it thoroughly wet, when the water is partly squeezed out of it, and it can be placed in the funnel pressing it partly into the neck, so that the solution will not flow under it when poured in.

The cotton wool does well for all ordinary filtering, but for very nice work, filtering paper is used. This usually comes cut in round discs from six to ten inches in diameter. To use it, the paper is folded through the middle and then folded again, when it can be opened like an inverted cone and laid in the funnel. There is another way of folding the paper, (in use by chemists,) bending it out and in, the corrugations largely increasing the filtering surface, the manner of doing which cannot very well be described without numerous illustrations.

In weighing chemicals always lay them on a clean sheet of paper in the scale pan, and, where a few grains only are to be weighed, balance this paper with an equal weight in the other pan.

In preparing solutions, weigh or measure every chemical

carefully. Formulas are not prepared by guess-work; when certain numbers of grains or ounces are given, they mean exactly those quantities. Carelessness here is simply the forerunner of failure.

We knew a gentleman who spent a whole summer photographing, and gave it up because nearly every negative he made was poor. He had neither graduating glass to measure his fluids, nor scales to weigh his chemicals, mixing everything by guess. If by happy guessing he was able to secure a tolerable negative, he was quite likely to let it spoil through insufficient washing after the hypo. bath.

CHAPTER IV.

DEVELOPING THE PLATE.

WE will now proceed to the dark-room to develop the plates which we have already exposed. For this purpose we have the choice of numerous formulas in which the acting developing agents are pyrogallic acid or hydrochinon. Of these for our first lesson we will take the hydrochinon, as that offers less difficulties for the beginner. Before closing the door of our dark-room we will mix the developing solution. The following formula is easily prepared, and we have always found it to work well:

Hydrochinon, 25 grains.
Sulphite soda crystals, 125 grains.
Carbonate soda crystals, 125 grains.
Phosphate soda granular, 60 grains.
Water, to make 4 ounces.

To prepare this, we take first from our stock solution of sulphite of soda twelve and one-half drams, which gives us 125 grains; we then measure out twelve and one-half drams carbonate soda and six drams of phosphate soda, which we add to the sulphite soda, and add water to make the whole up to four ounces. We pour this into a clean bottle, in which, after carefully weighing, we pour twenty-five grains of hydrochinon. We cork the bottle, and shake it occasionally for ten or fifteen minutes when it will be ready for use.

This developer, which is the same as our formula II. (chapter XXII) made here in one solution, we give simply as an illustration of the manner of preparing it fresh. It will be more convenient to make it as in the formula in two solutions, which will allow you then to add more or less of either No. 1 or No. 2, as needed to produce intensity or detail. The hydrochinon prepared as described in two solutions, will keep fresh for months.

We now prepare the fixing solution by pouring two ounces of our stock solution of hyposulphite soda into the japanned tray, to which we add two ounces of water, or simply use four ounces of "filtered hypo," if prepared as previously described. We use a black tray for the fixer so that we shall never be liable to mistake it for one of the developing trays. On no account must this tray be used for anything else. It must always be reserved for the hypo., and no drop of that must ever be allowed to get into the regular developing tray. Remember always to use plenty of fixer, entirely covering the plate.

Before closing the door and getting a plate ready for development, we very carefully wash out the one or two glass graduates which we have been using to mix our solution. We wash them immediately, because it is so much easier to clean them before the few drops of solution remaining in the glasses have time to dry. It is a good plan to wash thoroughly every graduate and funnel or tray immediately after using it, remembering always that it is not possible to keep these too clean, and that we are very likely to have trouble in some part of our developing or toning if we do not use perfectly clean glasses. We will now close the door and light our dark-lantern. Notice that there is no other light in the room beside the feeble light given by our dark-lantern, and when

this light is out the room is absolutely dark. A ray of daylight or gas or lamp-light in the room might instantly ruin the plate. As these plates which we are going to develop are slow plates, we shall develop them in all the light that our dark-lantern will give us, and we especially do this now so that all the processes can be distinctly seen. If the plates were quicker, or of a much higher sensitometer, and therefore more sensitive to the light, we should carry on most of the development at some distance from the dark-lantern where the light would be very weak, or else shield them from the light by placing a cover of dark paper over the tray during the development, examining the plates under the brighter light for a few seconds at a time to see how the development was working. Having everything ready, we now take one of the 5 x 8 plates from our plate-holder, and carefully go over it with a soft brush to remove any particles of dust which may have settled upon the film during or after the exposure. This brush must be kept always free from dust and moisture, and in a clean place. The plate being carefully dusted, we lay it, the film side up, in the tray, which we immediately rock to make the solution flow over every portion of the plate. If we notice that any air bubbles in the solution adhere to the film we must touch them at once with a fine, soft brush or with the finger. Should we not do this the bubble would prevent the developer from acting on that particular spot, and this would show as a transparent spot after fixing. We rock the tray slowly by gently raising one end and then the other to allow the solution to flow back and forth over the plate. After the plate has been in the solution twenty-five or thirty seconds the picture slowly begins to appear. First the portions of the picture that were the brightest, or the high lights

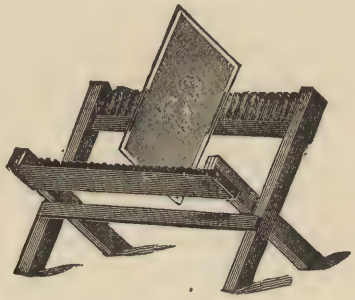
as they are called; that is, first the sky, and then any water which may reflect the sky and so appear bright, and then the lighter portions of the picture. After that follows the foliage, the foreground, and, lastly, the shaded parts; we continue the development until we are able to see some details clearly in the shadows, and also until the picture which had come out clearly begins to fade away. If we cannot judge of the intensity, nor see the details with sufficient clearness in the tray, the plate can be taken up and examined by looking through it at the light of the dark-lantern. With the first dozen or so plates we shall have to use considerable guess-work to know when the development is complete. But after a little experience we shall manage this without any trouble. The plate being now developed, we have to wash it before placing it in the fixer which we have already prepared.

We have here a nickel-plated instrument which we call our plate-picker. This you see is about six inches long, one-quarter inch in diameter, with a broad, sharp edge at one end, while the other end is made narrow and pointed; the broad end we use only in the developer, and the pointed end is used only in the fixer, the ends being made of different shapes so that no mistake can ever be made. We take this tool and very carefully proceed to raise one end of the plate by sliding the edge of the tool downwards at the end of the tray and then along the bottom until we are sure that it is underneath the plate. We are careful to do this in this way as otherwise we might accidentally shove the tool against the film side of the plate and scratch off part of the

film and picture. Raising then the end of the plate, we grasp it with the thumb and middle finger of the left hand and raise it out of the tray, the film side being towards that hand; then take the plate with the thumb and middle finger of the right hand, and with the film side down carry it to the tap which is over the sink. With the left hand we then turn on the water and wash first the side uppermost, which is the glass side. Having done this we turn the plate so that we can again take it in the left hand, with the film side up; then we transfer it to the right hand, the film side still being up, and in this position we let the water from the tap flow over that side of the plate. The reason why we manipulate the plate in this way, and wash the back side of it first, is that because when we first hold the plate to the tap, as it is in the dark, we are not sure exactly where the end of the tap is, and if the film side were up we might accidentally scratch that against the end of the tap; but, as the back of the plate is held uppermost first, in washing that side we learn just where the end of the tap is, and so when we come to wash the film side there is little danger of hitting that or scratching it. It is well also for another reason to get in the habit of removing the plate from the tray and washing it in this particular way, because we shall always know then just where the film side of the plate is and make no mistakes when we come to place it either in the fixer or the washing-box.

After this little washing under the tap we lay the plate directly in the fixer with the film side up. After this is done that tray can be covered with a sheet of pasteboard and white light be used in the dark-room. Indeed, after the plate is in the fixer there is little danger of its being injured by the gaslight.

After the plate has been in the fixer for five or six minutes, on raising one end of it, the white coating will be found to have nearly disappeared. After it has entirely disappeared, the plate should be left another minute in the fixing bath, and then removed and washed under the tap in the same manner as when taken from the developer; then after swabbing it carefully and gently under the tap, with a wad of soft, fine cotton wool, it should be placed either in a washing-box or on a washing-board to receive a thorough washing. The washing-board made after our plan (chapter V) will give a plate a thorough washing in twenty minutes, after which it should be swabbed again as above, and



then it can be set in the negative rack to dry. Before we place the plate in the rack to dry we will carefully wash the glass side. Sometimes there is a little emulsion on this side, and it is easier to wash it clean now than when we get ready to print. Care must be taken during all these operations, and especially during the drying of the plates, that there shall be no circulation of dust in the dark-room, as it might settle on the plate during the drying and injure it. The plate will take from 4 to 6 hours to dry, according to its size, and no one should ever attempt to hurry

up the drying by any artificial means, as the result would very likely be disastrous. It is possible to dry a plate quickly after the washing, by flowing over it alcohol, and swinging the plate in the air until dry. We do not, however, recommend this plan, as, unless very carefully managed, the film is liable to pucker.

It will frequently be the case that we have two small plates in the fixing tray at the same time, and caution should be observed in removing them. The fixing tray is usually black, so that we may not see exactly where the plates are when we have to take them out, and we therefore tilt the tray a little to show the location of the plates and thus avoid injuring the film with our knife. Some of these directions may seem trivial, yet it is in just such little points that we must always exercise care.

Again, the next time we use the old developing solution (which can be used over and over again as long as it remains clear), and for that purpose pour it from its bottle into the tray, we must not return it until the bottle has had a thorough rinsing. A little of the old solution, if left in the bottle, would tend to rapidly discolor the solution poured into it.

After taking the plate from the fixer and washing it, the fingers which have touched the plate must be thoroughly washed. Our other two plates can be developed in the same solution as the first. After we are through with the developments we filter the developing solution through fine cotton wool into a clean bottle, which we set aside for future use. The fixing bath, when we are through with it, should be thrown away if it is discolored. The bisulphite of soda will keep it clear for some time, but not indefinitely.

CHAPTER V.

THE DARK-ROOM.

AFTER the camera, a good dark-room is the most important matter to consider. We take it for granted that every amateur will desire to develop his own plates, as this is one of the most interesting processes in photography. Many we know content themselves with simply making the exposures, and send their plates to a photographer for development and printing, but in so doing they miss the greater part of the enjoyment of this beautiful art.

It should, therefore, be the aim of every one to have his own properly appointed dark-room; but, before explaining how this should be made, we will show how one can get along with the ordinary conveniences usually found in a home. Any closet will answer, if there is room in it for a broad shelf on which can be placed the dark-lantern and the trays for developing and fixing, and a deep pan, either round or square. Every crack or hole around the door where light gets in should be covered with dark cloth or paper. There should be a pail of clean water on the floor, if there is not room for it on the shelf, to use in washing the plates after developing and fixing, the plate being held over the pan while water is poured over it from a graduate. The final washing after fixing can be done in any convenient place outside the dark room, in the bath-room, or wherever there is space to arrange such a washing-box as we describe later.

For several months we washed all our plates in an ordinary set wash-bowl, spraying the water on the plates by means of a short tin tube fastened to the faucet, with one end flattened so as to make a broad, thin slit. In fitting up a temporary dark-room in the country we washed plates by laying them in an old wash-tub (with hole in the bottom for escape of water), letting a constant spray of water fall on them from a garden sprinkler.

All such arrangements however will only answer as a make-shift until one succeeds in having a real dark-room.

The dark-room should, if possible, be where it can be supplied with running water, and waste-pipe from sink. It should be as large as one can afford to have it, at least six feet square, eight by ten feet if possible. The door should be made light tight, and as an additional protection, thick felt or cloth should be tacked to the door frame for the door to shut against, on both sides and top, and on the bottom edge of the door.

When you think it is made perfectly safe it is well to shut yourself inside of it in the dark and stay there for some minutes until you get accustomed to the blackness, and then examine carefully for any crack, or nail holes, or anything of that kind through which light may come; mark these places and cover them securely with dark paper.

There should be a ventilator at the top of the room, preferably over the dark lantern, with two angles in it to prevent light coming through it into the room. A broad shelf should extend entirely around the room, about two feet four inches from the floor, except across the end where the door comes and where the sink is.

Entering the room from the door, there would first be on the shelf at the left a space for a drying-rack, which should stand on two or three thicknesses of newspaper to catch water dripping from negatives while drying. Then there would follow next a space on the shelf for emptying and filling plate-holders.

Next would come the dark-lantern, in front and below which the developing would be done, and then a space for tray to stand, while fixing. These would occupy all the space of the left-hand shelf. In the corner at the end of this shelf would stand the tank supplying water for washing plates. From the base of this, running down into the sink, place the washing-board. The sink at the end of the room opposite the door should be of iron, if possible, and about fifteen by thirty inches in size, and should have a waste-pipe, with trap in it, emptying into a drain. Over the sink and about fifteen inches above it should be the water pipe with two faucets, to one of which a rubber pipe is attached conveying water to the tank. Above this there should be a shelf, slightly inclining downward to allow the drip to run into the sink, to hold graduates and glass funnels. The shelf on the right side of the room should have under it three or four deep drawers for printing paper, filled plate-holders, and boxes of plates.

Above this shelf should be several shelves, broad enough and far enough apart to hold negatives standing on edge. There should be thin partitions between these shelves, about three inches apart, which space would be large enough to hold twenty-five or thirty negatives, separated by sheets of paper to prevent scratching. We think this is the most convenient arrangement for keeping negatives, placing them on these shelves

in consecutive order, with the figures "1 to 30," "31 to 60," etc., on the edge of the shelf over the proper apertures. As numbers are pasted on each negative, by storing them in this manner the particular one wanted can always be quickly found.

Returning now to the left side of the room, underneath a portion of the shelf on which the dark-lantern stands, a cupboard should be made containing a shelf, and having a door, to hold developers, solutions which should be kept in the dark, and some chemicals. Also eighteen inches above the main shelf there should be another shelf on which could be kept chemicals, kits, bottles and various other articles.

A very essential item in the dark-room is a towel. Hands need washing every time they come in contact with hyposulphite soda, while developing or toning. A drop of hypo. in either of the other solutions would interfere with their action. Glasses, trays and bottles which have contained hypo. should be used for nothing else.

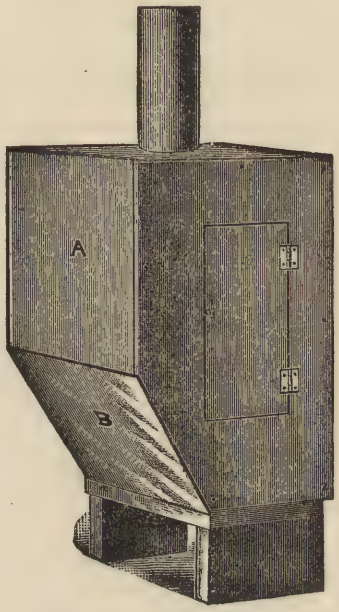
Everything in this room should be kept in its regular place and handy to be reached, so that one can at any time find what he wants in the dark.

If it is possible, and it would add immensely to the convenience of the room, there should be a gas-burner over the shelf on the right, to give light when not developing, and for use in making lantern slides, toning, etc.; from which also gas could be conveyed by a small iron pipe or rubber tube to the dark-lantern.

It is not by any means necessary that the amateur should make his own dark-lantern, as they can be obtained ready-made

from any dealer in photographic supplies. As many, however, may prefer a home-made lantern which will answer for every purpose, we describe the manner of its construction.

THE DARK LANTERN.



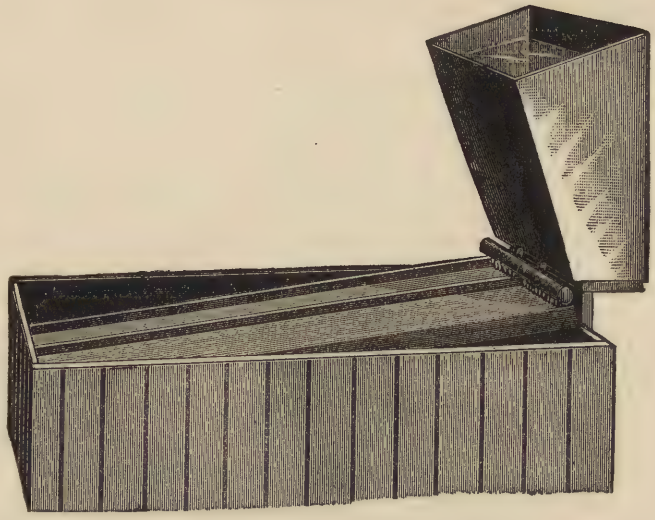
THE illustration shows the shape. It can be made of half-inch stuff, eighteen inches high, ten or twelve inches wide and deep. The lower front (B) is cut off across the corner, and the opening covered with two thicknesses of yellow post-office paper, through which the light comes for the developing. A door should be made in the side, with hinges, and cracks covered to keep light from coming through. A number of small holes should be bored in the back, just above the bottom, to let in air for the

lamp. For light, a candle, or small lamp or gas can be used. In the top, over the lamp, there should be a hole cut, at least two inches in diameter, and a metal pipe inserted for a ventilator. This pipe should have an elbow in it to cut off light. The top of the box inside should be lined with asbestos paper to prevent any danger of fire. The upper front (A) should be covered with two thicknesses of orange paper. A sheet of pasteboard in front of A, held in place by pins, will keep the light from the eyes while developing.

In the writer's own lantern, in place of covering the beveled opening with orange paper, he uses one sheet of orange glass, one of ruby glass, and one of ground glass. The two thicknesses of orange paper are, however, quite as good.

If a small kerosene lamp is used in this lantern, a wire rod can be attached to the arrangement for raising and lowering the wick, so that the light can be turned up or down from the outside.

To be certain that the dark-lantern gives a safe light, it should be tested by exposing half of a plate (the other half being covered) before the lantern for a minute. If on developing, the exposed portion is as clear as the unexposed part, the light is safe. The dark-room itself should be tested in the same way by exposing half of a quick plate five minutes. This is very necessary, and may save the fogging of innumerable plates, the cause of which is unsuspected.



THE PLATE WASHING ARRANGEMENT.

THE tank at the right should be made of zinc, or it can be made of wood, with two coats of black varnish inside. A tube is inserted in front near the bottom, three-eighths of an inch opening, to which a large zinc or brass tube, eight to ten inches long is attached at its center, and at right angles to the smaller tube. This larger one is perforated with one-sixteenth inch holes in a line along its lower side, the holes being about three-sixteenths of an inch apart. Through these holes the water from the tank is sprayed upon the plate placed on the washing-board.

In the place of the large zinc or brass tube, the writer uses a joint of a common bamboo fish-pole, making the sprinkling holes one-eighth inch, as smaller ones are apt to clog. This does just as well as the metal tube and is cheaper.

The washing-board is made of seasoned pine, one inch thick, ten inches wide, and as long as the sink. A strip of smooth wood, three-eighths or one half-inch square, is nailed along each side and another near the center of the board, so as to leave the two spaces between them three and three-eighths, and five and one-eighth inches wide. The narrower of these will hold plates three and one-quarter inches wide, and the other any width up to five inches. The board will be long enough to wash at one time half a dozen or more plates, separating them by pins. The plate first laid on the board is so placed that the water falls upon it near its upper end.

This is a most effective washing arrangement, plates being thoroughly washed in fifteen to twenty minutes, after which they are swabbed under the tap with cotton wool, and then placed in the rack to dry.

Larger plates, such as 6½x8½, 8x10 or 10x12, can be washed with this same apparatus by laying them on the top of the strips or divisions of the board.

While we consider this one of the best arrangements for washing plates, it must not be supposed that it is the only thing for the amateur to use. Ready-made washing-boxes of good design, can be supplied by any dealer in photographic supplies.

CHAPTER VI.

NOTES ON DEVELOPMENT.

AS a general rule, do not try to develop very many plates at one time; it is better to develop two or three plates in an evening, and do them well, than to try a dozen or more and be hurried and make failures of many. We speak from experience. On one occasion we brought in from a trip to the country about two dozen plates; some instantaneous, some timed exposures, and some detectives, developing them all in one evening. The result was natural, a few fairly good negatives, and some passable, the greater part poor. This was several years ago.

The only exception to the rule is where one is copying pictures of the same general character, and using one kind of plate, and knowing by experience the precise time for the exposure.

When you get ready to develop a plate be sure you know what the plate is, from what holder, and what exposure was given. Then you will be prepared to treat it intelligently.

Some photographers recommend soaking a plate in a bath of cold water before placing it in the developing tray. We cannot recommend this mode of procedure, for the reason that there are apt to be particles of vegetable matter in the water which are liable to cause spots in the plate. One spring we had a great many plates covered with spots, which we traced to the preliminary water bath. Since giving up this practice we very rarely find a spot on a plate.

Immediately after putting the plate in the developer take the tray in the two hands and rock it gently, so that the solution can quickly cover the entire plate. Bubbles will not touch and adhere to the film if there is enough solution in the tray to rise above the plate at least a quarter of an inch.

It is preferable always to have the tray away from the dark-lantern, holding it under the light only for a second or two at a time, to see how the development is proceeding; especially is this the case with all very rapid plates, which are so much more sensitive to the light than slow ones. With gas giving the light in a dark-lantern this can be very easily managed, turning the light up or down as desired.

In developing, (and this applies more especially to pyro solutions,) if the plate has been over-exposed, the image will come up rapidly; if under-exposed, it will appear very slowly. If it shows over-exposure a few drops of bromide should be put in the developer at once, and the tray rocked to spread this through the solution. Therefore have your bottle of bromide where you can get it quickly in the dark.

To judge when a plate is fully developed is learned only by experience. It would be well for the beginner to make two or three exposures of the same view with the same number of seconds, and develop them one after another, giving one more time than the other, and note the results of under and over-development.

Do not use the fingers to take plates out of the developer or fixer. If you cannot get the instrument previously described use a knife with large blade at one end for the developer, and small blade at the other end for the fixer, and keep both blades clean.

Or an ivory paper cutter, with ends of different shapes, so that you will always know which end is for the fixer.

In warm weather it is well to place the plate before fixing in an alum bath for a few minutes; this will harden the film and prevent what is called frilling or the peeling of the film at the edges. Some recommend alum in the fixing bath. We have never had a case of frilling, but old photographers advise the alum, and it is safe to do as they say. In developing plates in the summer we advise placing the tray in a larger japanned or wooden tray filled with broken ice.

Whenever it is possible use distilled water for dissolving chemicals. This is not necessary, however, for hypo. In winter collect clean snow, melt and filter it, and use in the place of distilled water.

As a general rule the simplest developers are the best. It is safe to follow the directions given by each manufacturer in using his plates. It is for his interest to have his goods produce the finest results, and he would advise nothing that he did not consider good. Still, we think hydrochinon the most generally satisfactory of all developers for every kind of plates.

Sometimes in parts of the plates, the developing seems to stop, some of the shadows will remain white. This may mean insufficient exposure, which is not easily remedied. In many cases, however, it will help matters if the solution is returned to the graduate, and then slowly poured on the spot, repeating this if necessary. Or a little more of the alkali may be added to the solution. If too much is added it may produce fog. For soda developer it will be well to keep on hand a saturated solution of carbonate soda, made by dissolving three ounces in five ounces

of hot water. A few drops of this may be sufficient to hasten development and bring out detail. A saturated solution is a solution containing all of the solid that the water will dissolve.

The active element in the developer, the pyro, hydrochinon etc., gives contrast and intensity; the alkali gives detail and harmony, and hastens the development.

A developer in which equal parts of Nos. 1 and 2 are used, works better in winter than summer. In warm weather it is well to weaken somewhat the solution and especially the No. 2, which is the alkali, remembering always that heat accelerates, while cold retards, development.

In detective views, and generally in instantaneous work, fresh solutions work best. With instantaneous exposures, we think that decidedly the best negatives are obtained by first soaking the plate a few minutes in a very weak solution of sal soda or carbonate of potash, or both combined. This has the effect of softening the film. After this it is best to commence with a weak developer which can be changed for a stronger solution after the details have appeared. There should be no attempt to develop such exposures quickly, but give them plenty of time. Old developer can be used for long exposures. In winter views, where there is strong contrast, use less of No. 1 and give plenty of time to the developing. If in any view there is great want of contrast add caustic soda in developing with hydrochinon to make it act quickly.

If in doubt as to the exposure the plate has received, it is safer to begin developing with a weak solution when using pyro. If the plate is known to be over-exposed let it soak first in the pyro solution a few minutes, and then add the alkali slowly. Or if

the exposure is known to be too short soak first in the alkali, and add the pyro slowly till the development is complete. Hydrochinon will act quite as fast as pyro if it is used without a preservative like sulphite of soda.

A good motto for the dark-room would be "Keep graduates, funnels and trays, perfectly clean, and don't hurry."

In developing plates, especially very rapid ones, it is always best to have only one in the tray at a time. Of course, if the tray is only large enough to hold one plate no one will try to develop two in it at once, but you may some time have a number of small plates to develop, and may think it economical of time to place two in the tray, side by side. If both are quick plates they may have had different exposures, and one may develop much faster than the other, so that when you remove them from the dark, (where the development is begun) to place them under the lantern, one of them may be so nearly finished that you may wish to keep it there while you watch the details coming out; and at the same time in the other the image may be only just beginning to appear, in which case, while the light from the lantern will not injure the one nearly developed, it may slightly fog the other.

After the plates have been placed in the fixer, a dim lamp or gas light will not injure them. The writer was developing a number of plates and had them all, as he supposed, developed and fixed, and, after placing them on the washing-board, turned up the gas, when he was surprised to find that one had not been fixed at all. He took it out of the wash and placed it in the hypo. without changing the light, and the plate fixed as well as any of them.

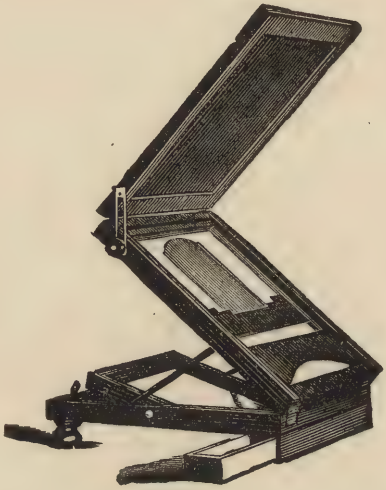
If a negative is over-intense, it may be due to too strong a developer, or to too long development. Thinness may be caused by either over-exposure or under-development. As such accidents are always liable to happen, the amateur will sometimes have a thin negative which needs intensification, or one too intense which should be reduced. These defects may be general, covering the whole plate, or there may be changes needed only in certain portions. If the reader will kindly refer to the chapter on formulas, he will find directions for these manipulations. Before attempting to doctor a negative, locally, if it is a valuable one which cannot be readily reproduced, it will be as well to make a transparency from it, as from this a new negative can be made if the original should happen to suffer during treatment.

Fog in a negative, in which the image seems to be clouded or veiled, may come from a variety of causes. A leak in the camera may cause this, or an unsafe dark-lantern, or light getting into the plate-holder. A developer too warm may produce fog, or one containing too much carbonate of soda.

Spots on negatives may be due to dust on the plate, or bubbles in the tray, or to washing the plate before developing. Such spots should be carefully touched with some opaque color applied with a finely-pointed brush, moistening the color with mucilage. This color should be as nearly as possible like that of the negative; neutral tint, carmine and Prussian blue mixed carefully, will make the right tint. Gihon's opaque is also excellent for such purposes.

As it is a very nice operation touching-out the spots in negatives many photographers prefer to fill the spots with a color so dark that they will show as white spots in the prints. These

spots are then more easily retouched, as the paper gives a better surface for the color, and the picture shows the exact tint required. Our illustration shows a very handy frame for retouching negatives.



Sometimes a bit of paper sticks to a negative, and it seems impossible to remove it. In printing, perhaps, a wet finger carelessly touches the film and the paper adheres. To remove it lay the plate in water several minutes to soak, and then very gently rub the paper with the ball of the thumb or finger until most of the paper is rubbed off. The rest will come off by placing the plate for ten minutes in the hypo. bath, after which it can be washed and dried.

The film of a negative, after drying, should feel smooth to the touch. If it feels at all rough it shows that the hypo. has not been entirely removed in the washing, and the plate should be carefully washed again for fifteen or twenty minutes.

CHAPTER VII.

PRINTING ON READY-SENSITIZED PAPER.

We describe this first because for the beginner it is the simplest process of silver printing. A good quality of ready-sensitized paper can be procured of any dealer in photographic supplies. The articles required for printing, in which we shall include toning and fixing, are:

One or two printing-frames.

One half pound powdered borax.

Thirty grain vial chloride gold and sodium, and a glass or porcelain tray of suitable size for toning the prints.

The prints can be fixed in the same tray in which the plates are fixed, but it is better to have a separate tray for toning rather than use for that purpose the same tray as used in developing. The sizes of printing-frames desirable are, say 2 5x8, and 2 8x10. Each of these should be fitted with a plate of thick, clear glass, which will serve as a support for any small negatives when we have occasion to print from them. Also with each frame there should be a piece of close-grained felt not too thick and cut the size of the frame; the object of the felt is to hold the sensitized paper firmly in contact with the negative when printing. Before printing with ready-sensitized paper it is important that the paper should be fumed, and for this purpose

the amateur should make a fuming-box. The following description of one used by the writer will enable any one to make such a box without difficulty. The size is not important so long as it is large enough. We found around the house a packing-box which measured about 18 inches long and 12 inches wide and 10 inches deep. We fastened the cover on by two hinges, so that when the box was standing on end, this would open like a door; then about two inches from the bottom, (we are supposing now that this box is standing on end) we tacked on each side two wooden cleats about one-half inch square; then we cut a sheet of pasteboard of the right size to be placed in the box and supported on these cleats. This pasteboard we perforated with fifty or sixty small holes about $\frac{1}{8}$ of an inch in diameter. We leave space enough between the pasteboard and the bottom of the box to allow us to slide under a small saucer, which for fuming,we partly fill with ammonia. Then we make two more cleats and tack these to the two sides about an inch below the top of the box. We then cut about half a dozen strips of soft wood about one-half inch square and just long enough to slide across the width of the box on the two upper cleats. Finally, we paste strips of paper over all the cracks or any places where light might get through into our box, and it is complete. To use it we pin by the corners small sheets of sensitized paper to the strips of wood, and slide them into the box on the upper cleats. The paper thus hangs down in the center of the box, care being taken not to allow the sheets to touch each other. We then pour the ammonia into the saucer, place it in the center of the bottom of the box under the pasteboard and close the door. The paper should remain in this fuming box about twenty minutes, when it can be taken out and kept

in a dark drawer or box until ready to use. In an hour you can fume as much of the paper as you will require for your printing during the day, that is, unless you are attempting to print on a grand scale. Having your paper now fumed, we take the negative and place it in the printing-frame with the film side up, having previously carefully dusted off the plate. Then, on this negative lay the sheet of fumed paper with the sensitive side in contact with the film side of the negative; upon this lay the felt and then the back of the printing-frame.

Now, it will frequently be the case that there are some negatives very intense which will take a long time to print. Prints from such negatives, and such only, should be printed in the direct sunlight—facing squarely the sun. This latter point is essential, as otherwise the edge of the frame would throw a shade on the plate, and where this shadow falls the picture would be only half printed. If your negative is not too intense but is what might be called a good printing negative, it should not be exposed to the direct sunlight, but should rather be printed in the shade; or, if turned towards the sun, the frame should be covered with white tissue paper. If the negative is a thin one, it must be printed in the shade. Understand that by a thin negative we do not mean that the glass is thin, but that the image is thin, and can be seen through very distinctly when held towards the light. If the negative is so thin that the print, even when made in the shade, is flat and weak, it will be well to print it in the sunshine, covering the frame with a sheet of yellow or orange glass. We have made vigorous prints in this way from negatives that seemed too thin for any

kind of print. Under the head of "Transparencies," we shall show how to make new and stronger negatives from such weak ones.

Slow printing always makes the richest prints. Half of the back of the printing frame can be raised so that the print can be examined from time to time; care, of course, being taken not to allow the paper to be moved from its first position, otherwise the print will be blurred. If you print against the glass on the inside of a window be sure that the glass is clean, with no spots on it. The printing is to be carried on until the picture is one or two shades darker than it is desired to have it after toning. After printing and toning one or two batches of prints there will be little difficulty in deciding how deep the printing should be carried. When examining the prints in the frame, care should be taken not to allow sun-light to fall upon the paper, and the frames should be opened, therefore, away from the strong light.

It sometimes occurs that a portion of a negative is thin, and prints very quickly, while the rest is intense and very slow in printing. To remedy this and get an even print, we can hold a sheet of rather thin, white paper over the thin part of the negative while printing in the sunlight, the paper being cut so as to shade only the parts which we wish to cover. The paper should be kept slowly moving so as not to let its outline show in the print. If this does not suffice, we can paint over the thin portions on the *back* of the plate with Gibon's opaque, and rub this off when the more intense parts are nearly done. Or, the thin portions can be retouched on the *back* of the plate with one or two coats of Prussian blue, applied with a fine water-color

brush. Previous to doing this the glass should be well cleaned with powdered pumice stone, rubbing it with the finger moistened with alcohol or water, and then carefully brushed off with a clean, soft cloth. This will allow the color to lie smooth.

TONING AND FIXING PRINTS.

The operation of toning should be carried on either in the evening by artificial light, or it can be safely done in the daytime, but not near a window admitting a strong light. As fast as the prints are finished they should be put in a dark box until they are ready for the next operation. It is better that the prints should be toned the same day they are printed, though it is not necessary to do this; they can be kept a week or more if desirable, but it is better to tone them before too large a number accumulates, as it is alway easier to tone a few prints at a time than to undertake a great many. Before toning, the prints should be trimmed carefully, and the trimmings saved in some box or drawer; they contain silver, and hereafter we shall explain how to get the silver out of them. To make the toning solution, we take a pint bottle and pour into it an ounce of powdered borax. We fill the bottle with hot water and shake it until the borax is entirely dissolved, then we set the bottle away to cool. Then we take a four ounce bottle which we know to be perfectly clean, and pour into it the contents of our thirty grain vial of chloride gold and sodium. The gold does not all run out, but we shall attend to that in a few minutes. Carefully cleaning our four ounce graduate we pour into it thirty drams distilled water; we pour a few drops of this into the gold vial, which dissolves the gold, which we then pour into the four ounce bottle. We continue this several times,

pouring a little water into the vial and then pouring that into the other bottle, until we are sure that all of the gold is out of the vial, when we pour the balance of the thirty drams into our bottle and cork it. This bottle now contains thirty drams water, and thirty grains gold and sodium, and we label it:

Chloride gold solution.
One dram equals one grain.

We now prepare the fixing solution by pouring into our fixing tray two ounces of our hypo. stock solution, two ounces water and two drams of our carbonate soda solution. By this time we will take it for granted that our solution of borax is cool, and we take of that two ounces and two ounces of water, to which we add one dram of our gold solution. This makes the toning bath, and we pour it into our toning tray. After using this toning bath, unless we have more prints to tone the same day, it should be thrown away. We now take a clean tray, large enough to hold our prints, and fill it nearly full of water. Into this we lay the prints one by one, face down, pressing them carefully under the water so that no air bubbles adhere to the paper. We stir them about in the tray and shake the tray for a few minutes, and then pour the water off, which we notice is slightly milky: we then fill the tray again and shake it well to let the water freely circulate among the prints, and again pour off the water. We repeat this operation half a dozen times, and the time before the last we add to the water about three drams of our stock solution of carbonate soda. In large photograph establishments the water from these first two or three washings is always saved as it is very rich in silver. But amateurs, unless they expect to do a good deal of printing, will not find it to pay to save these

wastes. We shall, however, in a subsequent chapter explain how all these wastes can be saved. When the prints are finally washed, which, it will be noticed has changed them to a somewhat reddish color, they can be placed in the toning bath. It is not desirable to have more than six or eight in the toning bath at one time, and, therefore, if we have a dozen in the washing-tray we will tone at first only six of them. We place them in the bath one by one, face down, pressing each one well into the solution to insure its being wholly covered. We now gently rock the tray to circulate the solution thoroughly through the prints and after a few minutes we raise them at one corner and carefully draw out the lower one, which we examine to see if it is sufficiently toned. If not toned, we replace it on the top of the others and again draw out the under one: this, we keep repeating until the toning is done, which will be when the prints have a rich purple tint, when examined by transmitted light. This tint should show rich and warm right through the paper. The peculiar tint can only be learned by experience. Do not slight the matter of turning the prints. If allowed to remain some time in the toning bath without this constant changing there are liable to occur small or large spots where air bubbles prevent the toner from acting, and such spots retain their reddish color. Should such spots be seen, they can usually be cured by turning them, print face up in the tray, and pouring some of the solution on the spots from a graduate. When toned sufficiently the prints should be placed in a tray of clean water, and the other batch of prints placed in the toning bath to go through the same operations. After all the prints are toned they should be thoroughly washed in the washing tray in five or six changes of

water; they are then ready for the fixing bath and are to be placed in the fixer one at a time, face down. The fixing tray should be rocked occasionally, and the prints changed once or twice, from the bottom to the top, as in toning. The prints should remain in it about fifteen minutes. The fixing bath should be used for only one batch of prints. While they are in the fixer the salt bath can be prepared, which is made by dissolving about one ounce common salt in four ounces of water. The object of the salt bath is to prevent blisters, which are very annoying when they occur in the prints. Blisters, however, in spite of all precautions, may occur, and it may be well to know how to manage them. Lay a clean piece of blotting paper on a smooth board, or on the top of your table, and upon this lay the wet print, face up. Then cover the blister with another sheet of blotting paper, and very gently rub the paper directly over the blister with a circular motion. This rubbing should be very light at first, the pressure being gradually increased, and after a few moments the blister will be found to have disappeared, or will leave but a slight trace, which cannot be seen after the print is dry. After the prints have been a sufficient time in the fixer they are transferred directly, one at a time, to the salt solution, in which they should remain five or six minutes, and then, after rinsing in fresh water, placed in the washing-box. Dealers in photographic materials generally have washing-boxes for sale, but we have always found the following the most serviceable for our own use. We take a large, clean earthen jar, the larger the better (our own holds about 10 gallons) which we stand in a sink or bath tub, the water being let into it by means of a rubber tube, running from the tap to the bottom of the jar. The prints are placed in

this when filled with water, which being fed from the bottom and overflowing the edges keeps up a continual circulation. The prints should remain in this at least an hour, and two if possible. One advantage of this jar for the washing-box is, that there are no sharp corners in it to tear the prints. After the washing is complete the prints can be taken out and laid face up on newspapers, or suspended on clean strings, to dry, or they can be immediately mounted on cards.

If only a few prints require washing it will not be necessary to place them in the jar with running water. They can be washed as well in a tray of water, which should be rocked to circulate the water well among the prints. After half a dozen changes of the water, the prints should be laid separately on a sheet of glass, first face down and then face up, letting a good, strong stream of water flow over them. This will effectively wash out all the hypo from them. And it is essential that prints should be thus thoroughly washed to prevent their afterward turning yellow and fading.

CHAPTER VIII.

MOUNTING AND BURNISHING THE PRINTS.

THE prints can be mounted as soon as they are washed, or the mounting may be deferred to some subsequent time. In the former case the prints should be taken directly from the water and laid one above the other, face down, on a sheet of glass, and all the surplus water should be squeezed out of them. The handiest thing for doing this is a small rubber roller, which can be procured of dealers in these materials. If the prints have been allowed to dry after washing them, they will, of course, need to be thoroughly moistened again by soaking in water.

A good paste for mounting prints can be made by soaking about one-half ounce of common laundry starch in one ounce of cold water for say half an hour, and then adding to this two ounces of boiling hot water, and immediately stirring the mixture. This paste will not keep, but should be used the same day that it is made. A paste that will keep, which will answer for mounting photographs and for various other purposes for which a paste is required, can be made in the following way: Take about two ounces of common laundry starch and two ounces of water, and stir these together in a saucepan until it is like a thick cream; add to this one pint of hot water and about seventy-five grains sheet gelatine, cut into small pieces, and stir these together well, and let them boil on the stove for six or eight minutes, and then

set it to cool. Now measure out one ounce of alcohol and about fifteen drops of ordinary diluted carbolic acid, which should be added to the paste before it has become entirely cold. If strong carbolic acid is used the quantity should only be about one-third of the above. This paste should be kept in a wide-mouth bottle well corked.

Now to return to our prints. With a bristle brush, a brush about one inch wide is a convenient size, we apply the paste to the back of the uppermost print, taking pains to distribute the paste evenly over the whole surface, especially at the edges and corners. If any pieces of grit or hard substances should be seen in the paste they may be removed with the blade of a penknife, Now, raise one edge of the print carefully with the knife blade, and, taking the print in both hands, lay it upon the cardboard as smoothly as possible at an equal distance from all sides. Upon this lay a sheet of clean blotting paper, and with a circular motion lightly go over this with the hand, pressing the print to its place, taking care that it adheres at the edges and corners. Then the card should be placed on edge to dry

After mounting albumen prints, and before burnishing them, any light or white spots caused by opaque spots in the negative should be "spotted out." To do this we prepare a solution of

Water, one ounce.
Alcohol, one dram.
Gum arabic, sixty grains.
Glycerine, fifteen drops.
Ox-gall, ten grains.

Dissolve these, and keep in a two ounce bottle.

Mix the colors on a paint slab or saucer to match exactly the tint of the print, using a few drops of the above solution to moisten the paints. With carmine, Prussian blue and neutral tint, any shade can be matched. Apply this very delicately and carefully with a fine-pointed brush.

When the prints are almost dry they can be burnished. The burnishing iron should be heated and kept hot during the burnishing, about the same heat as a flat iron in ironing clothes. Care must be taken to keep the polished surface of the burnisher bright and clean. When the iron is hot enough the prints should be lightly rubbed with a glacé polish, which is sold for this purpose, and is applied with a small wad of flannel. Then the prints should be passed through the burnisher two or three times, the burnisher being so adjusted that the pressure on the prints is rather light; the degree of pressure will be quickly learned by experience, more pressure being required if the prints have been allowed to become dry before being polished. White castile soap will do very well as a lubricator for the prints before burnishing, and is applied in the same manner as the above.

It may often happen that it is not convenient to burnish prints the same day they are mounted, in which case they can be subsequently moistened safely in the following way: Set a developing tray filled with water in the bottom of the fuming box previously described, and upon the perforated pasteboard lay the mounted prints, on edge, so that they do not touch each other, and close the door tight. In a few hours they will become sufficiently moist to burnish.

If it is desired to have the prints polished without mounting it can be done in the following way: Procure one or two sheets

of highly polished rubber and lay the wet prints face down on these, putting on as many at a time as the rubber will hold; then all the water should be squeezed out of the prints with a rubber roller, and after that the surplus moisture should be soaked up from the back of the prints with blotting paper, the prints being firmly and smoothly pressed into contact with the rubber. They will dry in half an hour or so, when they can be easily removed from the rubber, and will be found to come out perfectly flat and with a beautiful, brilliant polish.

Every amateur should have a large album for his workroom, and paste in it one print from each negative made. Above this should be marked the number of the negative, and below it something like the following:

Carbutt B.—6—f32—10 B. May 10, 1890.

This shows the kind of plate used, the number of seconds of exposure, the size of stop, the time of day, whether bright or cloudy, and the date.

This will be a reference book, showing at a glance whether the time and stop were correct for such a view—a helpful guide for future work.

To mount quite large photographs we dampen a piece of thick blotting paper, cut to the exact size of the print, and lay this upon the back of the card for about ten minutes previous to the mounting. When the print is pasted on the other side both sides of the card will dry at the same time and remain flat.

Albumen prints have a tendency to curl very much in drying, which can be prevented by soaking them, after the final washing, one by one for a few minutes in a solution of pure glycerine and distilled water, mixed in the proportion of one part glycerine to

five parts water. When removed from this the superfluous moisture should be absorbed by gentle pressure between sheets of clean, white blotting paper. After this they should be laid out flat to dry, when they will become soft and smooth. At any subsequent time they can be mounted dry, using paste or gelatine, and burnished.

CHAPTER IX.

BLUE PRINTS.

There are few processes in the art, which are as simple and easy to follow and capable of such beautiful results, as making prints on blue paper. As the paper is so easy to prepare, every amateur should make his own, because it is always better for being perfectly fresh. Any good close-grain, hard-surface, wove paper is good for our purpose, and the heavier the better. The best paper that the writer ever used for this purpose, was some very heavy paper especially prepared by Crane. A so-called book paper will not answer, as it is too porous. But any paper that makes a good writing paper, will also make good blue paper. To prepare the paper, the amateur will need a very fine, soft sponge, one of those usually called a nursery sponge. For convenience in handling this, about half or two-thirds of the sponge should be inserted in the neck of a rather wide mouth bottle, which will serve as a handle. The part of the sponge outside the bottle should measure about one inch and a half in diameter, to be the proper size for applying the sensitizing solution. For the solution, procure several ounces each of citrate iron and ammonia and ferricyanide of potassium (red prussiate of potash) C. P. The chemically pure is very much to be preferred to the ordinary commercial article, because it produces a

much more brilliant blue. Take of the latter 256 grains and dissolvein a four ounce bottle of water; cover the bottle with an opaque paper and label it,

STOCK SOLUTION.

Red prussiate of potash.
1 dram equals 8 grains.

We make a stock solution of this because it will keep indefinitely. The other chemical used in sensitizing blue paper will not keep, and therefore should be prepared fresh every time.

Having previously prepared this potash so that it will be dissolved and ready to use when needed, we dissolve 50 grains citrate iron and ammonia in one-half ounce of water. This takes but a few minutes to dissolve. The citrate of iron and ammonia should be kept in a wide-mouth glass bottle and corked tight, so that no air or moisture can get to it. Having the two chemicals now dissolved and ready to use, we pour into a small graduate four drams of the potash solution, which is the same quantity as we are going to use of the iron and ammonia. We place our funnel in our four ounce graduate, having previously placed in the bottom of the funnel a small wad of wet cotton wool, and pour the potash into the funnel and immediately follow it with the half ounce of iron and ammonia. They will filter through the cotton in a few minutes, and to this solution we add about one grain of bromide of potassium from the stock solution which we have at hand. This bromide must be used judiciously. If all the paper is to be used within a week, do not add any bromide. It is only to be added where the paper is to be kept for some uncertain time. Too much bromide will make the paper

print slowly. The object of this bromide is to keep the sensitized paper fresh. Now take the paper which we wish to sensitize, and cut it to a convenient size, as it is much easier to sensitize smoothly a small sheet of paper than it is a large one. We pin this paper by the four corners to a smooth board on which has been placed a sheet of clean paper. Any drawing board will answer for this purpose, if it is soft enough to hold the pins. Now we take the sponge and moisten the end of it, so that it will take water freely, and then squeeze all the water out of it, and dip the sponge in the sensitizing solution that is in the graduate. The sponge will suck up more than we need, so we press it against the glass to squeeze out a part. The quantity can only be learned by experience.* With the sponge in hand, now swab the paper gently, smoothly and quickly, beginning at the upper left-hand corner and brushing lengthwise across the paper, continuing this, always working the sponge in the same direction, until the surface of the paper is covered with the solution; then immediately, without again dipping the sponge in the glass, swab the paper at right angles to the first direction, beginning at the lower left-hand corner and ending at the upper right-hand corner. This should be done quickly and smoothly. Hang the paper up to dry, by one or two of the pins, where no dust or dirt can get upon it, and proceed to sensitize another sheet in the same way. After sensitizing the quantity needed, the paper, which will dry in a few minutes, can be cut to different sizes. All of these operations, of course, should be done in the evening and not by daylight. If all of the solution is not used

* Use just enough in the sponge to brush over the paper without allowing the solution to *flow* or *spread*.

do not attempt to preserve it, but throw it away and carefully clean out the glass. So much for the paper.

Blue paper should be printed preferably in the sunlight, as it may take several hours to print in the shade, and the printing should be continued until the dark portions of the picture assume a kind of bronze color. A little experience will show just how far to carry the printing. When the printing is done, the print should be placed in a tray of water, face down for a few minutes, and left there until the whites in the picture come out clear, or till the white margin around the picture comes out white, when it can be hung up to dry. It is not necessary, of course, to put the prints in the water, as soon as they are printed, as they can be kept for a day or two, and a number of them washed at the same time.

We think it is a very good plan in making blue prints to have one or two large frames, so that the blue print can be printed in the center of a large sheet of paper, when it will show like an engraving, with a broad margin around it. Suppose we have a frame, the inside of which is 11 x 14 inches, for which we have a piece of glass cut the same size, as a support to the smaller negative from which we wish to print in this frame. If our negative is 5 x 8 inches for example, we cut out a sheet of thick opaque paper 11 x 14 inches and in the center of this, for a 5 x 8 negative, we cut an opening, say four and five-eighths inches one way and seven and a half inches the other way. Placing the negative in the center of our frame on the glass, we lay upon it this black mat, so that all the margin of the negative is entirely covered, and upon this we lay our sheet of blue paper, cut the same size, 11 x 14 inches. We make a print from this, and on

putting it in the washing-tray, we find that all of the blue solution on the margin washes off, leaving all of the paper except the picture pure white. After it is dried, it should be pressed smooth under a heavy weight.

Plate marks can be made on these prints in the same way as described in the following chapter.

CHAPTER X.

PLAIN PAPER AND ALBUMEN PAPER.

TO our mind there is no process of printing that can compare in an artistic sense with prints on plain paper. The gloss and shine of albumen prints are not pleasing to the eye; they usually detract from the beauty of the picture. If albumen prints do not appear finished without a polish, it ought to be an objection to the use of that paper. We hardly think that a person who possesses a fine engraving would consent to have it polished. That would give it a cheap and tawdry appearance.

The plain paper is altogether easier to prepare than the albumen, and the process is so simple that anyone can make it, and make with it most beautiful pictures. Perhaps the simplicity of its preparation is one reason why amateurs are not encouraged to use it, as it would lessen the demand for other papers in which there is greater profit.

The same paper that is used for making blue prints will answer for this purpose. Care should be taken to select a paper that is smooth and not too hard, of pure linen stock. The paper first requires to be salted, for which purpose we prepare a solution as follows:

To 16 ounces of hot water add 16 grains sheet gelatine, and when this is dissolved add 50 grains chloride ammonium.

After this solution has become cool, it should be filtered. The

paper should be cut a little larger than it is intended to be when finished. That is to say, if we wish to make some 8x10 plain paper, it would be well to have our sheets for sensitizing 10½ or 11x16½ or 17 inches. Or, if we wish to make 5x8 paper, the paper should be cut either the size mentioned before, or about 8½x10½ inches, as a large sheet can be prepared about as quickly as a small one. Having our paper ready, we pour the solution into a tray, a trifle larger than the paper, and either float the paper upon it or immerse the paper in it. In the first case only one side, the side which comes in contact with the salt solution would be salted. In the latter case both sides. If only one side of the paper is salted it will be necessary to mark the other side with a pencil to show the right side for sensitizing. The manner of floating the paper upon the solution is as follows: Take the paper by two opposite corners, one in each hand, and bring the two corners nearly together; lay the paper gently upon the solution, letting the two corners down in such a way as to drive out any air bubbles that might get beneath them. Then if the corners curl upward, either blow them down or press them down with the fingers till they lie smooth. The paper should remain on the solution about three minutes, when it should be removed by raising one corner, and then hung up to dry. All these operations, of course, are done by daylight. In place of floating the paper upon the solution, it can be wholly immersed, which is much the best way, as well as the easiest. This is done by placing one side of the paper in the solution at the edge, and shoving it along under the solution until the whole is in the tray. If any air bubbles are seen on the paper they should be immediately touched with the finger to remove them. The

paper should remain in the solution half a minute, and then be hung up to dry as before. Where both sides in this way are salted it is, of course, unnecessary to mark either, as the sensitizing can be done on either side. The paper will dry in twenty or thirty minutes, when it will be ready for sensitizing, or it may be kept for any length of time until needed. The time for leaving the paper *in* the solution will vary with different qualities of paper. From ten to fifteen seconds will be long enough for a soft, smooth paper. Hard papers, such as are used for ledgers, require longer time.

The above we should call a normal salting solution. If we decrease the quantity of chloride ammonium to thirty grains, we should have a weak bath, which would require a weak sensitizing solution, thirty to thirty-five grains of silver in the place of the sixty grain solution we describe hereafter.

Or we might make a very strong salt bath by increasing the quantity of ammonium to one hundred grains. Paper so strongly salted should be sensitized with a solution containing sixty-five to seventy-five grains of silver in place of the sixty grains mentioned.

The quality of the negative determines the strength of the sensitizing solution; for a weak, thin negative the paper should be strongly sensitized and printed in diffused light, or exposed to the sun with a sheet of white paper in front of the printing-frame; for an intense or slow printing negative, the paper should be sensitized with a weak silver solution, and printed in the sunshine.

For all ordinary negatives, however, it will be found that the salt bath we give first, and the sixty grain silver solution, will answer every requirement.

In fact, we have used this with uniformly good results on negatives ranging all the way from slightly thin to intense, varying the strength of the solutions only in cases of extreme thinness or intensity.

Another salting solution is the following:
Sheet gelatine, 35 grains.
Chloride ammonium, 100 grains.
Citric acid, neutralized, 100 grains.
Water to make 30 ounces.

Dissolve the gelatine in fifteen ounces of hot water, and add the chloride ammonium. Then dissolve the citric acid in four ounces of water, and neutralize it by adding slowly, with continual stirring, two hundred grains carbonate of soda crystals, or half that weight of the dried soda. When the solution ceases to effervesce, it should turn red litmus paper blue; or it will be just as well to place in the mixture a small piece of blue litmus paper which has been reddened in the acid before adding the soda. This is then to be poured into the first solution, and water added to make the quantity up to the thirty ounces. After filtering, it will be ready for use as previously described.

This is the old formula for salting paper. We do not think it gives as satisfactory results as the salting solution first mentioned.

TO PREPARE THE SENSITIZING SOLUTION.

For this purpose we should have two glass graduates perfectly clean; into one pour one-half ounce of water and add to this sixty grains nitrate silver crystals. They will dissolve in a few

minutes by stirring them with a glass rod. When dissolved we add, drop by drop, concentrated ammonia; a dark brown precipitate will be formed. Keep adding the ammonia, drop by drop, and after about thirty drops begin stirring with the glass rod; after awhile, the dropping and stirring being continued, the ammonia will redissolve the dark precipitate, and the solution will begin to grow clear. When it is perfectly clear pour one-half of the solution into the other empty graduate; then, to either one of these solutions, add drop by drop strong nitric acid, stirring the solution with the glass rod. Continue adding the acid until the solution turns blue litmus paper red; then pour the acid solution into the solution in the other graduate and add water to make up to one ounce. This is the solution required for our sensitizing. If made in the day time these operations should be carried on in the dark-room, or it can be made in the evening by gas or lamp light. The solution should be poured into a bottle covered with dark paper, and will keep indefinitely in a dark place.

We will now proceed to sensitize the paper, which can be done in the evening by gas light. We lay a sheet of clean paper, larger than the paper we wish to sensitize, on a smooth board, and to this we pin a sheet of the salted paper with the salted side up. The pins should be placed in the four corners of the paper, and as near to the edge as possible.

We now have to describe how to make the brush for applying the solution. For this purpose we need a glass tube three or four inches long, and about one-half inch in diameter inside. In case we do not have this we can break a hole through the bottom of a four-ounce bottle, and use that in the place of the tube. We pass the loop of a doubled string—clean white cord is the best to use

for this purpose—we pass this loop through the tube and run through it, that is through the loop, a wad of fine cotton wool. We then, by pulling on the two ends of the string, pull a portion of this wad into the tube, the greater part of it forming a sort of

ball or brush at the end. The ends of the string are then fastened securely around the tube, and then the wad is trimmed neatly with scissors, cutting off all the loose ends. This sensitizing brush should be from one inch to one and a half inches in diameter, the size depending somewhat upon the size of the paper which we wish to sensitize. If we wish to prepare a sheet of 5 x 8 paper only, a very small brush will answer for that purpose. Everything being ready, we pour a few drams of the silver solution into a four-ounce graduate, and in this we place the brush, allowing it to soak up as much of the solution as it will. Then with the paper before us on the board as described, and inclined

towards us, we take the brush and swab the paper, beginning at the upper left hand corner and brushing across the paper to the right until all the paper has been covered. With the first sheet of paper, if it is a large sheet, it may be necessary once or twice to take up a little more solution on the brush. As soon as we have thus finished the paper we turn the board at right angles to its former position, so that one end will incline towards us, and immediately, without adding any more solution to the brush, swab the paper across, beginning at the top and working down to the bottom of the paper. This cross brushing prevents the formation of any streaks which might make their appearance if the paper were brushed one way only. Also, care must be taken, in laying on the solution, always to brush right to the edge of the paper.

The board should now be laid flat, and after a few minutes, or as soon as it becomes partly or surface dried, the paper should be hung up by two corners to dry. As this is done in the evening it is not necessary, of course, to hang the paper in the dark-room. When a sufficient quantity of paper has been sensitized and allowed to dry thoroughly, which it will do in fifteen minutes, it can be cut to the required size, and the clippings preserved with the clippings from ordinary silver paper. The sheet of paper on which the paper has been sensitized should also be kept for subsequent use. Any silver solution remaining in the graduate should be returned to the dark bottle, and the brush, when dry, can be added to the clippings of silver paper, as it is quite rich in silver. This brush should never be used a second time. This silver paper which we have now made should be printed on the next day or two after being made, or it can be preserved for

several weeks by keeping it in a dark box between sheets of blotting paper that have been saturated with a solution of carbonate soda and afterwards thoroughly dried. The solution of carbonate soda for this purpose should be in the proportion of two ounces carbonate soda to twelve ounces water.

In using this plain paper we print several shades deeper than in using ready sensitized paper: the prints are toned and fixed in the same manner as the other prints and washed in the same way. They will not need to be passed through any salt water bath after the fixing, as they do not blister. The borax bath is altogether the best that can be used for toning these prints. It is very essential that the washing before toning should be thorough. We usually soak them in a tray for an hour, changing the water at least eight times.

An excellent way of using this plain paper is to sensitize an extra heavy paper, and then make the prints in the center so as to leave a broad margin of white outside; that is to say, suppose we have our sensitized paper 8x10, then we cut some sheets of thick, black paper 8x10 inches outside and cut in the center of these square openings which shall take in all of the 5x8 negative that we wish to use. A good size for these openings for 5x8 prints would be 6½ or 7 inches long and 4½ inches wide. Care must be taken, of course, to have the sides of the openings parallel to the outside of the paper. Others, with the same outside, might be cut to make prints from 4x5 or quarter size plates. In using these masks the negative is laid face up on the large plate of glass in one of the 8x10 printing-frames, then the mask is laid over the negative, care being taken to see that it covers the edges of the negative completely, and then the sensitized paper

is placed upon this. When printing, care must be taken in setting the frame in the window or elsewhere, to handle it gently, as a jar might slightly move the negative and blur the print.

If one is so situated that he has the use of a copying press, he can very materially add to the elegance of these prints by pressing a plate mark upon them. To do this cut several sheets of thin mounting card so that they shall be about half an inch longer and wider than the prints, taking pains to have the edges smooth, straight and sharp. For instance, if the picture is 4½x6½ inches, the card should be cut 5x7 inches, and the corners very slightly rounded. When the print, after the final washing, is almost dry, lay it upon two sheets of clean blotting paper, and, upon the picture, lay the prepared card so that it shall extend beyond the picture just a quarter of an inch each way, which can be done accurately by marking its position with a pencil; over this lay a sheet of clean paper, and cover this with another sheet of blotting paper. This is then laid carefully in the press, and given a moderate pressure, allowing it to remain in the press for five or ten minutes, till the print has become dry. If all this is neatly done, the result will be a beautiful picture, in finish equal to fine engravings or etchings which are so much admired.

All prints, especially of landscapes, whether in albumen, plain salted, or blue paper, can be trimmed fearlessly. It is seldom necessary to print the full size of the negative. Frequently there is something at each side or top or bottom that may be omitted, which will add to the finish of the picture. Therefore, make opaque masks of different sizes and shapes, oblong, oval, round, and shave down the

paper around the inside to make it very thin at the edge, and cover the mask with white tissue paper. This should then be laid in the printing frame under the negative, and the printing done in sunlight. Try this and see what beautiful pictures it will make.

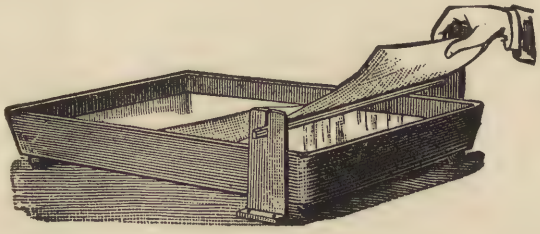
ALBUMEN PAPER.

Albumen paper, ready for sensitizing with silver, can be procured from dealers in such goods, of better quality than any one can make for himself. The usual size is 18 by 22 inches, and to sensitize a full sheet requires a tray somewhat larger to hold the silver solution. It will be more convenient, however, for the amateur to cut the paper to slightly more than double or quadruple the size required for his plate, which will allow the use of a smaller tray. The paper to be sensitized should be kept in a damp place for half a day before use, as it is more easily and smoothly floated on the silver bath if slightly damp. The silver solution should be prepared by dissolving in a glass bottle:

Nitrate silver, 600 grains.
Distilled water, 10 ounces.

When this is dissolved, it should be tested by laying in the bottle a small piece of litmus paper. If the litmus paper is not reddened slightly, showing its acidity, add drop by drop nitric acid, shaking the bottle after each drop, until the paper changes to a faint red. Paste a bit of paper on the bottle on a line with the surface of the solution. If it is desired to sensitize a full sheet of paper in a large tray, a proportionately larger amount of solution should be prepared.

When ready to sensitize the paper, this solution is poured into the tray, and the paper floated upon it in the same manner as described in the beginning of the chapter, raising the paper by each corner to remove with a glass rod any air bubbles that may adhere. The paper should float from a minute to a minute and a half, and then be removed by drawing it over a glass rod or or tube laid across the tray near one end, to scrape off smoothly



a portion of the solution. Hold the paper by one corner over the tray to allow the solution to drip off, and then hang up to dry in the dark, using for this purpose the ordinary spring clothes pins.

After all the paper required has been sensitized the bath can be returned to the bottle. As the paper has taken up a portion of the water and silver, the solution should be restored to its original strength by adding water to bring it up to the marked place, and then adding twenty grains of nitrate silver for each half sheet (11x18) sensitized, or in that proportion. The bottle can be wrapped in black paper, and laid away in the dark room. The sensitized paper will dry in a short time, when it can be cut to the sizes required, and laid between sheets of soda paper, in which way it can be kept fresh for several days.

CHAPTER XI.

STOPS AND SWING-BACKS.

IN some lenses, all of the stops or diaphragms are cut in one circular piece of brass, which revolves in the lens tube, each one of the holes stopping by turn exactly in the center. In other lenses the stops are inserted separately, and are of from three to seven or eight different sizes.

The smaller the stop used the more detail will be shown in the picture, and the longer time will be required for the exposure. It is not advisable in all photographs to have the detail as fine and exact as it can be made, but in taking a picture of a building, especially if it is a building containing much ornamentation, delicate carving or relief work, fine arches, etc., it is desirable to have the detail come out clear and distinct. So, too, with interiors. In such cases a small stop should be used. Small stops give a sharp focus, and tend to bring objects near and distant into the same focus, and with equal distinctness. Although this is not as the eye sees things, it is yet sometimes desirable.

With large stops, if we adjust the focus to a certain distance, objects nearer and beyond are out of focus and indistinct. Therefore, if we wish to take a picture of a house in the country, with a group of people sitting on the lawn in front, and show all clearly, we must use a small stop.

Large stops give more detail to the shadows, that is, the shaded

portions. Large stops give boldness; they make the more artistic pictures. They should be used when taking moving objects, because they require so much less exposure. In landscapes never use the smallest stop, nor in using the swing-back; but rather always use the largest stop that will give sufficient sharpness to the main object.

Stops are usually numbered with reference to the focal length of the lens, as f8, f11.3, f16, f22.6, f32, f45.2, f64, which means that f8 is one-eighth, f64, one-sixty-fourth, the focal length, etc. Therefore, if the focal length is eight inches, f8 will be one inch in diameter, f16, one-half inch; f32, one-quarter inch, etc.

The size of stop regulates the duration of the exposure, the smaller the stop the longer the exposure, inversely in proportion to the squares of their diameters. Therefore if a stop of one-half inch diameter required for a certain view two seconds exposure, a stop of one-quarter inch would need eight seconds, and one of one-eighth inch, thirty-two seconds, while another of one inch would need only one-half second. If, therefore, experience has taught us the proper exposure to give with an f16 stop, it will be a simple calculation to tell the necessary exposure for any other stop.

THE SWING-BACK

Is used to prevent distortion when tilting the camera to take in a tall building; also to bring a distant and near object into focus at same time.

We focus on a distant object and find the foreground out of focus, because the focus is shorter for distant views than for near objects. For distant objects, we draw the lens nearer the

ground-glass to get the focus; for near objects the lens needs to be further from the glass. To bring both in focus, we focus on a point in the center of the ground-glass; about half way between foreground and the distant object. In one case the focus falls a little behind the ground-glass, in the latter, it falls in front. So we use the swing-back, which we suppose to swing on its center, drawing back a little the upper part (the foreground), which pushes forward the lower part (distance), and this will bring both in focus, and at the same time it does not disturb the middle distance, as that falls in the center of the ground-glass, which practically remains in about the same place.

So with the side-swing. In taking a picture with some object, a tree for instance, near us on the right, to bring it into focus we swing back the left side of the ground-glass, on which the tree shows, till it comes in focus, swinging it back just enough to bring that side in focus without disarranging the focus of the more distant view. When making use of the side-swing or swing-back, we can employ a larger stop than usual, and still preserve the depth of focus to obtain which a small stop is ordinarily used. A picture is said to have depth of focus, when the foreground and distance are both in focus, details showing plainly in both. From the artist's stand-point, details everywhere are not admissible.

CHAPTER XII.

LANDSCAPES.

LANDSCAPE photography is the most healthful, instructive, inspiring and delightful branch of the beautiful art. It leads one into the wholesome air of the country, to the lakes, sea-shore and the mountains, to quiet dales and laughing streams, to early morning tramps; teaches him to study nature and observe her varying moods; reveals to him visions of the picturesque and the beautiful, that without this incentive would have remained to him unseen.

There is no royal road for the landscape photographer; patient study and intelligent observation are constantly required. He must study pictures that attract him, to see wherein lies their charm. The finest camera and the highest priced lens are not the essential things, but the knowledge how to use them. A picture by one of our great painters, a modest, quiet man of rare insight, depicts a meeting of two hunters; one, a sportsman with his complete and elegant outfit, *with no game*, is showing his expensive breech-loader to the other, a lank, seedy countryman, with nothing about him to indicate a hunter, but an old, muzzle-loading, single-barrelled gun, and a score or more of ducks. And our fine sportsman seems to sigh as he says, "why can't I get them?"

The introduction of figures and of animals in landscape is

usually desirable, but they should never be made too prominent. There should be a fitness about the figures, they should look as if they belonged in the picture. Naturally therefore, it would be a defect to have them exactly in focus, or be rendered with fine details, unless the object is to take the picture of the group of people or of the animals; in which case the landscape is sacrificed to the portraiture. Many landscape views are failures, through the introduction of people in the immediate foreground, staring at the camera as if they had rushed in where they did not belong and were not wanted, to "get their pictures taken." Those who have tried to take views of charming bits of scenery in our public parks, know what a desire some people seem to have to get into the view; and stop where they are entirely out of place.

For pictorial effect all figures should appear unconscious of anything like posing.

The chief feature in the landscape should not be placed in the center of the plate, nor should the picture seem to divide itself into two equal parts. The point of view must therefore be carefully selected, setting up the camera in different places to try to get the best effect.

A small stream in the northern part of Illinois is often explored by those summering in its vicinity, who have heard of its varied and picturesque scenes. A young lad took his little skiff one July day, with a lunch and a twelve dollar camera, and spent the whole day on this stream, rowing back and forth sixteen or twenty miles. He had six plates with him, and when he returned at night, it was a matter of some surprise that he had only made three exposures. He set up his camera to take others, but something about the light or the shadow did not suit him, and he

seemed content with what he had secured. He did his own developing, and the result was three beautiful pictures, two a quarter size and one a 5 x 8. A week later, two older amateurs, of large experience, with fine cameras and Dallmeyer lenses, spent a forenoon on the the same stream and took a dozen or more views. But none of them were, as pictures, quite equal to those made by the lad with his cheap lens. They all saw the same scenes, but the younger had the more patience, and perhaps the faculty not given to all, of discovering the beautiful in common things. The larger of these pictures we have used as an illustration in the chapter on "Ornamental Photography."

In general, the sun should not be directly behind the camera, but rather at one side, not being allowed, of course, to shine into the lens. It is not necessary that the sun should be up at all—very charming views can be obtained in the early, bright mornings of spring, before sunrise.

Moonlight effects can be had, by pointing the camera directly toward the sun, with exposure somewhat longer than usual. If such a view is taken across the wavy surface of a lake, and carefully developed, it will give a very striking imitation of a moonlight scene.

Foliage taken during a light shower, produces a fine effect. Foliage generally shows to better advantage when taken in the spring before the leaves are fully developed, than later in the summer.

Waves and the surf on the sea and great lakes are best taken, when on bright days, the sun is concealed behind a cloud. In taking views of still water, the camera should not be turned

towards those portions which reflect the sky, or the water will look like the sky, white and harsh. Still water looks best when it has, in the near background, trees or high hills. There may be occasions, however, when it is necessary, in order to get a particular view, to have in the foreground water, which does reflect the sky, in which case the exposure can be lessened by holding the slide a moment in front of the lower half of the lens opening. So, too, to shorten a sky exposure, the slide can be held in front of the upper part of lens.

A view containing sharp shadows, dark foliage, as well as much light in other portions, or in other words, strong contrasts, should be given ample exposure. Long exposure tends to soften contrasts, to give harmony, and if carried too far, weakness. Short exposures, while apt to give some degree of hardness, will make more brilliant views, and give strength and character.

Winter views, in a bright light, with abundance of snow and sharp contrasts of light and deep shade, should usually be given long exposure, using a small stop.

If it is a bright day, with the sun obscured, which will have the effect of diminishing the contrast between light and shade, the exposure may be shortened.

In landscape work, after one has acquired some familiarity with development, the amateur should experiment freely. It would be well to take the same view on half a dozen plates, half of them slow, and half rapid, giving varying lengths of exposure and different stops, carefully noting the results.

For example, suppose you are using a lens of eight inches focus and a Carbutt B 16 plate. Take a favorite view,

and make nine exposures on a quarter plate, at noon on a bright day, with stops and times as follows:

$\frac{1}{8}$ inch stop (f64), 8, 12, 16 seconds,
$\frac{1}{4}$ " " (f32), 6, 8, 10 "
$\frac{1}{2}$ " " (f16), 4, 6, 8, "

Each plate before placing in the holder, should have a number marked with a pencil in one corner, to identify it afterwards. These marks will show plainly after development. Make one print from each plate and mount them all on one large card, marking under each the kind of plate, time and stop. From these, if the development has been successful, you can select one which will give you the standard stop and time, for such a subject in such a light, and from this in a short time, the correct exposure for any view will be judged instinctively. The proper exposure is the one most important point to be learned in photography, without which the highest excellence is impossible, and this can only be learned by careful, systematic experiment. After this everything is simple.

We advise a trial of orthochromatic plates in general landscape work. These should always be used when there are varied colors in the view, especially in autumn, when the leaves have changed to purple and red, and in photographing flowers. Colored screens are necessary to give value to different colors, directions for using which accompany the plates. The handiest way to use such screens, is to have them in the diaphragms. The thin discs of glass used for covering microscopic slides, which can be colored to the tint desired, can be attached with glue to the

center of the diaphragm, which should have enough of the metal cut or milled out around the opening, to allow the glass to lie flush with the surface.

Whoever wishes to produce landscape prints of a high order of excellence, will give them an artistic finish by adding clouds. It requires some patience to do this, but the result, if carefully and appropriately done, will amply repay all the trouble and extra time.

To do this well, a number of cloud negatives should be made on plates of different sizes, in the spring or early summer months. The horizon should be low, so as to take in as much of the clouds as possible, and the exposure short. The plates should be a little under-developed to print quickly. The exposures should be made at various times of the day, to secure a variety of negatives from which to make an appropriate selection to suit the different views in printing.

To use these, the landscape is printed as usual, the sky being masked by coating that part on the back of the plate with some opaque color, unless it is so intense as to print perfectly white. Remove the negative, and cover it with a sheet of thin, white paper, on which, when held to the light, the outline of the landscape can be traced with a pencil. With this as a guide, a mask of opaque can then be cut, which will cover as near as practicable the entire landscape. The cloud negative is then to be placed in the frame, with the print upon it, and while printing, the mask must cover the landscape, and be gently moved to and fro to avoid a harsh line. After one or two trials there will be no difficulty in this, and the picture will appear to be printed from a single negative.

CHAPTER XIII.

PORTRAITS.

GOOD portraits can be made in the house by the amateur, if he pays due attention to lighting the subject, and gives sufficient exposure. The sitter should be near a window, about three or four feet from it. If sunlight falls on the window, the light should be diffused by hanging over the window a thin, white sheet, or covering it with white tissue paper. The side of the sitter away from the light will be shaded, and this can be lightened by placing a white sheet, or anything that will reflect light, about three or four feet distant, and in such a position that it will reflect some light on the dark side of the face. If this is not sufficient, the operator can hold a mirror, about two feet square, in such a way during exposure, that it will throw some light on the shaded portion of the figure. Both sides of the face should not be equally lighted, as it will produce flatness. The camera should stand about the same distance from the window as the sitter, or a trifle nearer, and should be a little above the head, so that it may be inclined downwards. Arrange the sitter gracefully, avoiding all awkwardness or stiffness; pay attention to the position of the hands, that they are in focus and not too conspicuous, and, if the whole figure is to be taken, see that the feet are not out of proportion, by being thrust towards the

camera. Focus on the eyes, and see that they are looking in the direction the face is turned. A quick plate should be used, a medium size or large stop, and ample exposure. The exposure should be three or four times as long as an out-door, or even longer than that, according to the light.

The time required to take a portrait in the house, can only be learned by experiment. Let some obliging friend sit for you, and take his picture several times over, using different stops and exposures. Plates are comparatively cheap, and this will be a valuable lesson.

The background should not be so near the sitter, that shadows will fall upon it, and should be of a drab or pearl color. For flash-light portraits at night, we prefer a background of black velvet, as described in the following chapter. This also makes an admirable background for portraits taken out of doors; a black shawl will answer as well. Against such a background, profile views show finely. Out-door portraits should not be taken in the sunlight but in diffused light, in the shade, or the north side of a building.

Do not wastes plates trying to take portraits on a dark or cloudy day in the house, or in the fall or winter too late in the afternoon. Especially is this the case where you have to take a portrait of a very young child who can not keep still long enough for the proper exposure.

In photographing out of doors, do not try to take portraits or groups with the sky, or water reflecting the sky, for a background. In such cases the features will come out dark. We saw a view lately, of a group of people on the upper deck of a lake steamer, taken towards the open water and sky. The only one showing

plainly in the print, was a lady who happened to have behind her the black smoke-stack. Had the steamer been headed the other way, towards the high hills, the portraits would all have been good.

CHAPTER XIV.

ON INTERIORS.

INTERIORS are too often neglected by the amateur for want of the proper lens, the patience requisite for the long exposure, and the fancied difficulties.

The lens should be a "wide angle," to take in as much of the interior as possible, capable of showing three sides of a room. A bright day should be selected, to give the greatest quantity of light in the room, and this should be diffused by hanging white sheets over the windows furnishing the light, taking care that it does not shine directly into the lens. If a window comes in view, it should be covered with dark cloth, hung inside the window frame, and when the exposure is nearly complete, this cloth can be removed for a few seconds.

In focusing, the camera must be level, to have perpendicular lines show correctly. A piece of white lace, or something of the kind, laid over a chair at the chosen distance, will be an easy thing to focus on. Use the smallest stop, as details and "depth of focus" are wanted. A rapid plate should be used, as the time will be long in any case, and over-exposure need not be feared. In a fairly lighted room, a quick plate may require half an hour; in a dim light, half a day. Therefore choose a bright day, but let no sunlight in the room. The artistic skill and taste of the operator will have ample swing in arranging the various

articles, furniture and ornaments, to make an attractive picture. Polished surfaces of chairs or tables may reflect light; they should be moved or partly covered to avoid the unpleasant shine.

In photographing interiors, it is sometimes desirable to take the view towards an open window, showing not only the interior plainly, but also the landscape without. The simplest method we have found to accomplish this result, is to give a double exposure, one by daylight for the landscape, and the last for the interior, by flash light after dark, it being understood that the camera must remain in exactly the same position for both. The focus should be made on the interior, with the stop used for flash light, and the landscape taken with a small stop. Then, leaving the camera in position, make the second exposure by flash light after dark, with the larger stop, remembering, of course, to leave the window in the same condition, curtain drawn aside, and sash up as before.

Interiors can be taken by gas light, using the most rapid plates and long exposure. The light should for this purpose be as brilliant as possible, and not come from any point where it can shine into the lens.

FLASH LIGHTS.

Interiors and portraits can be advantageously taken by using the magnesium flash light. In using this, care must be taken to procure a magnesium compound that is perfectly safe, and especially should one be careful in igniting it. We think the magnesium cartridges prepared by the Scovill and Adams Co. are safe to handle, and they give careful directions for their use. The cartridge should be placed on an old plate or something of

that kind, at the side of the camera and about on a level with it, and a little back of the lens. A large sheet of white paper or a white cloth sheet should be placed behind the flash, to reflect the light on the object to be photographed. There should be an abundance of light (gas or lamp light) in the room, so arranged that it will light up the subject well, and avoid disagreeable reflections. Focus on a lighted candle or lamp placed at the point which is to be in focus, and remove this before picture is taken. Use very rapid plates and a comparatively large stop. When all is ready, draw the slide, light the fuse and remove the cap from lens, replacing it immediately after the flash. Plenty of light in the room serves to eliminate the dark shadows caused by the brilliant flash. Where portraits, or groups are taken, it is well to have a black screen behind the sitters to absorb the shadows.

If pure magnesium is used for the flash it should be ignited by means of a long taper. There are many contrivances for sale by the trade which are quite safe to use, care being observed to follow the directions carefully.

CHAPTER XV.

HINTS ON COPYING.

IN the winter the amateur can fill up his time and find ample use for his camera in making portraits, interior views, copying and reducing pictures, and making lantern slides and transparencies. He will have frequent occasion to copy large photographs and engravings or paintings, for the purpose of making book illustrations, or for lantern slides. In copying an engraving or photograph, or a painting, the process for each is very much the same, the main difference being in the time required for the exposure, and, in the case of copying paintings, the special kind of plate to be used for that purpose. To copy a photograph or engraving with the ordinary camera, the picture should be hung or clamped to an upright frame, where its surface can be made perfectly flat and smooth. The picture should be so hung that it may receive a strong light, not sunlight. If you have a window facing the north, the picture should be near the window and partly facing it; then the camera should be placed directly and squarely in front of the picture, the lens being of the same height as the center of the picture. Care must be taken to have the camera directly in front of the picture, so that the picture will be exactly parallel to the ground-glass; then there will be no danger of any distortion in the negative. This is of the utmost importance. No true copy of a picture can be made unless the plate or

ground-glass and picture are parallel, A slow plate is the best to use for copies. In copying on cloudy days in the fall or winter, we prefer very quick plates. The camera is placed near, or at some distance, from the picture, as the copy desired is to be large or small. In making a copy for a lantern slide it must, however, be remembered that the picture is to be copied *across* the small plate, and not the long way of the plate, in the same way that pictures are always printed upon lantern slides. The ground-glass should be marked in pencil so that it will show the location of all smaller size plates; that is, if your camera is a 5x8 size, you should lay out on the ground-glass the position of the ¼ size and 4x5, and also of the 4¼x6½, which is the half-size plate, if you expect to use them. Then, when, as in the present case, you wish to make a copy on a quarter size plate, the picture, when in focus on the ground-glass, will show whether the camera should be moved nearer to, or be set further back, in order to get the copy of the desired size. In copying it is essential that the focus should be as exact as possible, and, to aid in getting a fine focus, it is a good plan to lay a piece of printed paper against the picture and focus with the magnifying glass on the letters, remembering to remove the paper before making the exposure. When the focusing is done, a small stop should be inserted in the lens, and the cap put on so that it can be removed easily, which must be done without jarring the camera in any way. The time of exposure will vary according to the subject to be copied. We may say that, using an f32 stop, the time will vary from 50 seconds to 5 minutes. An ordinary engraving or photograph that has a dark, strong tint, will require less exposure than a picture printed light or altogether in half tone.

Highly burnished photographs, especially such as are not flat, are difficult subjects to copy. The light must be so arranged that no part of the glazed surface will reflect any band of light into the camera.

To photograph white statuary requires long exposure, and screens properly adjusted to light up the subject. A white screen should be used over the window to diffuse the light. If circumstances admit, altogether the best arrangement is to photograph statuary out of doors, in the shade, with a black screen for a background. In developing, use more than the usual quantity of No. 1, to secure great intensity.

An engraving in outline, simply black lines, will require long exposure, perhaps three times the exposure of an ordinary photograph. A copy of a printed page or of a letter in black ink will need long exposure, and also long and intense development. Copies of paintings should be made always with orthochromatic plates, and the painting should be so hung for copying that there is no bright light reflected from it into the camera. The light illuminating the painting must come from directly in front, to avoid little shadows that might be caused by oblique light falling on thick patches of paint. If any doubt exists as to the proper exposure to be given, it is safer to lean to the longer time. It has frequently been our experience in copying engravings that the difference of one or two minutes in the exposure made no difference in the quality of the negatives, provided only that time enough was given.

CHAPTER XVI.

LANTERN SLIDES.

LANTERN slides by the dry-plate process are made either by contact printing or by reduction in a reducing camera. In the latter case the slides can be made direct from any larger negative, provided that the negative is not too large to be used in the reducing camera. In making lantern slides by contact, the most convenient size for the negative is a quarter size, although slides can be made by contact from larger negatives in those cases where only a portion of the negative is required to be copied. As the simplest method of making slides is by contact, we will confine our present observations to a description of that process.

Lantern slides are made on plates specially prepared on thin glass 3¼ x 4 inches in size. They are usually made in the evening by lamp or gas-light, and in the ordinary printing-frames. They can be printed by daylight, but, as that light is so much stronger than artificial light the slides print in a much quicker time, and consequently the danger of over or under-exposing is very much increased. Where gas-light is available we much prefer that, but in places or towns where there is no gas, what is known as a No. 2 kerosene burner will take its place. In using gas-light care should be taken to maintain as even a pressure in the gas, and consequently as even a brilliancy in the light,

as possible. To do this the gas burner should be unscrewed and a little wad of fine cotton wool inserted, which will somewhat check the flow of gas and allow it to burn with a more even flame. Should we not do this the gas is liable to flare up at times, from too great pressure in the main, and give more light than we should expect, thereby tending to over-expose the plates. In printing the slides the negative is placed in the printing frame as in ordinary paper printing, and the thin plate placed upon it, with the two film sides in contact. Care should be taken to see that there is no dust on either of the two plates when they are thus placed in contact. It is well also to place back of the slide a piece of black cloth, cut to the proper size. The frame being filled, (and it is perfectly safe to fill the frames with these plates while the gas is turned down to a blue flame) it is held in the hand on a level with the gas jet, and about eighteen or twenty inches from it, and the gas quickly turned up. The time required for the exposure will depend upon the quality of the negative. This time may vary from two seconds to twenty seconds. In practice we have found the general time to be about seven seconds. In making slides with a kerosene lamp,the printing-frame should be covered with the focusing cloth, which can be removed at the moment of exposure and replaced immediately at the close. After making a few dozen slides it will be found that the appearance of the negative, while being exposed to the gas-light, will indicate the proper time. Experience will teach this accurately, as well as the exposure of plates in ordinary landscape photography. Very intense negatives, will, of course, require longer exposure, and can be held a little nearer the light; very thin negatives should have a sheet of white tissue

paper on the printing frame which will considerably increase the time of exposure. A very thin negative will also make a good slide if the frame, in exposing to the gas, is covered with a sheet of yellow or orange glass. In this case the exposure will need to be six to eight times as long as usual. It has been our experience that negatives developed with hydrochinon are the most even printers in regard to time. Negatives developed with pyro are extremely uneven, varying from very quick to very slow printers, while negatives developed with ferrous-oxalate are usually quick printers.

After the exposure has been made, the exposed plates can be immediately developed, or can be placed in a box, and a number of other plates can be similarly exposed. For the development we have a choice of several different developers, all of which are good. We can use either hydrochinon, pyro, ferrous-oxalate or eikonogen. As we think the hydrochinon developer is the safest for the beginner to use, we will use that for our first slides. The following formula we have found always to work well on lantern slides.

No. 1.

Sulphite soda crystals, - 400 grs.
Dissolve and filter, and add water to make 6 oz.
Hydrochinon, - - - - 120 grs.

No. 2.

Carbonate potassium, - 240 grs.
Water to make 6 oz.

For use take one ounce each of Nos. 1 and 2, and add two ounces of water; the quantity of water added can be increased or

decreased as may seem best. With this developer, the image begins to make its appearance in about thirty seconds, after which it proceeds rapidly. The development should be carried on until the picture comes out clear and distinct. That part of the plate outside of the image should be carefully watched during the development, as the plate should be removed from the developer before these parts lose their white color. If washed and transferred to the fixer, while this part of the plate is still white, after fixing the white portion becomes clear glass, as it should be in a perfect lantern slide. If, however, the plate is left in the developer until the white of these portions has turned slightly gray, or a little darker in shade, those parts after fixing will be found somewhat clouded, and the image on the glass in consequence will be too intense.

The fixer, for lantern slide plates developed with hydrochinon, should be a little weaker than is used in ordinary fixing baths. We have found a good proportion for this, is one ounce hypo. dissolved in ten ounces of water. A weaker solution of hypo. will fix lantern slides; we have used it as weak as one ounce hypo. to twenty-four ounces of water. The exact proportions do not appear to be very important, but we think it should always be much weaker than for ordinary plates. After fixing, the plates should wash in running water for half an hour, then carefully swab under the tap, with a wad of fine cotton wool and place in the rack to dry.

Lantern slides, for use in the lantern, require to be mounted. The usual way is to cover the slide with a plate of thin, clear glass, placing between the glasses a mask of thin black paper, cut out the proper shape inside to show the picture, and then the edges of

the two plates are bound with a strip of black needle-paper: it being understood, of course, that the film side of the slide comes between the two glasses. Another way, which we have found to be practically as good as the above, is to paint the slide with Gihon's Opaque, applying this to the film, covering all of the plate except the picture, and leaving if desired, a slight margin of clear glass around the image. After this is thoroughly dried, it can be covered with thin glass and the edges bound as above.

CHAPTER XVII.

TRANSPARENCIES.

TRANSPARENCIES are usually made in the same manner as lantern slides by exposing to gas or lamp light. In printing, a mat or mask of opaque paper should be used, so as to leave a narrow margin of clear glass outside the picture. Transparencies can be made on any plate, either rapid or slow, the latter being preferred. As in all contact printing both the negative and the plate should be carefully dusted before placing in the frame: and it is well to place a dark cloth above the plate to avoid any reflected light from the back of the printing-frame. A slow plate, of sensitometer equal to a Carbutt B 16, requires an exposure, at eighteen inches from an ordinary gas-light, from two to six seconds, according to the intensity of the negative; while a quick plate of sensitometer 25, needs from one-eighth to one or two seconds. As soon as the exposure is made the plate can be taken from the printing-frame and developed immediately, or placed in a light-tight box and developed later with others.

The transparencies should be developed in the same way and after the same formula as the lantern slides, but the development should be carried a little further and be made somewhat intense. When finished the transparency should be backed, the film inside, with a sheet of ground glass or imitation ground glass, which we

shall describe how to make in our formulas hereafter. Then it can be bound at the edges with paper, or placed in metallic frames kept by all dealers.

Some dry-plate makers prepare a special plate for transparencies, having an opal or ground-glass finish on one side, which requires simply a sheet of plain glass on the film side to protect it from injury.

A very neat way to make transparencies is to print them by contact and gas-light on Eastman's transferotype paper. These require an exposure of from fifteen to forty seconds, and should be developed with the *hydrochinon lantern slide developer.* After development they should we well washed, then fixed in hypo, and washed again. When washed the print should be laid face down on a sheet of clean, clear glass, of the proper size, and the water removed with a rubber roller or squeegee. The glass and the print should then be laid on some flat surface, with a sheet of blotting paper on the back of the print, and left to dry under pressure. When dry the print will adhere to the glass, and, if desired, the paper can be removed as described in the directions accompanying the package of transferotype paper, and backed with ground glass.

We think, however, the better way is *to leave the paper on,* and simply back it with plain glass, as the paper is a most excellent substitute for the ground glass.

It is sometimes of advantage to duplicate a negative, which is done by first making a transparency, which is a positive, and from that, in the same way, a second transparency, which will be a negative. In the same way a new and stronger negative can be made from a very weak one.

Sometimes one may have occasion to make a transparency for enlargement from a negative which may be very intense in certain portions, while very thin in others. To correct these inequalities in the transparency make a mask of thin, white paper of the proper shape to cover the thin portion, which can be supported on a pasteboard frame, the opening in which is the size of the negative. During the printing, this mask, by means of the stiff frame, can be held close to the printing-frame, so as to shield the light from the thin parts, allowing it to act on those which are too intense, to bring out detail, the mask, of course, being kept constantly moving. A new negative can be printed by contact from a transparency so made, in which the original defects of local intensity or thinness will be found corrected, the result being better than if resort were had to chemical means.

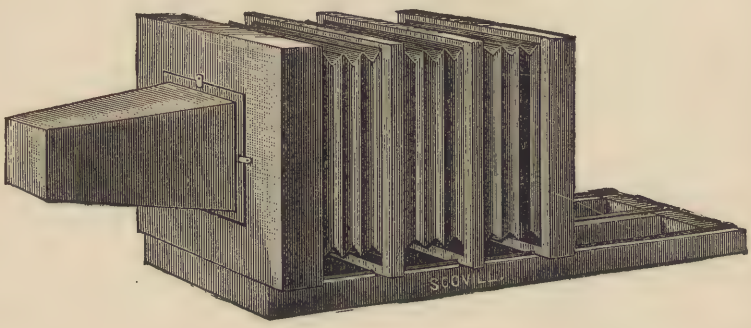
Very pretty blue transparences can be made in the following way: Dissolve fifteen grains of sheet gelatine, cut into fine pieces, in an ounce of hot water. When this is cold, pour a portion of it on a sheet of *clean* glass, tilting this to allow the liquid to spread over the surface, and stand on edge to dry. This can afterwards be sensitized with the same solution we use for making blue paper by *flowing* it over the plate, and allowed to dry by standing on edge.

The printing and developing can be done in the same way as with blue paper Before printing, as the glass cannot be removed from the frame to examine it, in order to know the time required for the exposure it will be necessary to make a blue print on paper from the same negative, and take note of the time required for that.

CHAPTER XVIII.

ENLARGING AND REDUCING.

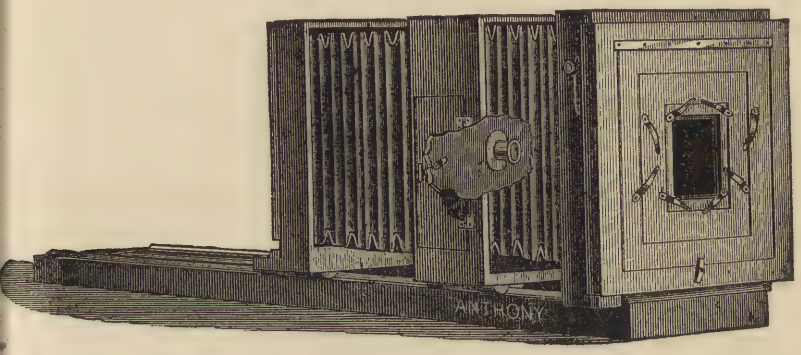
THE amateur will have frequently to make an enlargement or reduction of a picture or photograph, or copy exact size; and to enlarge or reduce from a negative. Reduction from a picture can be done in an ordinary camera, and full-size copies can also be made, if they are not to be larger than the largest size of the plate used with the camera, by attaching a cone to the front,



and placing the lens at the extreme end of the cone. The cut above shows how this is arranged.

A different arrangement is required for making enlargements, and we therefore give an illustration of an enlarging, copying and reducing camera.

The entire length of this is about five feet, and it is suitable for making copies either full size, or larger or smaller; for making positives direct from negatives in either size; for making negatives direct from transparencies or positives; and for making lantern slides direct from large negatives. The cut shows the lens mounted on the central frame, in position for making a reduction or lantern slide, or an enlargement, the negative being placed in one of the kits in the front. with the film side towards



the lens. Double sets of kits for all the ordinary sizes of plates usually accompany these cameras, for use in the plate-holders and the front; also a table, showing the location of the lens, with respect to the front and ground-glass, for different degrees of enlargement and reduction, for lenses with a focus of from two to nine inches. In enlarging or reducing from a negative, the light enters through the negative, and the camera should face the open sky. If trees or buildings intervene, the camera should be placed near the window, with a white board or mirror on the outside, inclined upwards at an angle of forty-five degrees, to reflect the light into the camera, avoiding sunlight. The time of exposure

will depend upon the amount of light, the quality of the negative, the sensitiveness of the plate or paper, and the degree of enlargement. The larger the copy required, the longer in proportion must be the exposure. If an exposure of two minutes is correct for enlarging a 4 x 5 to an 8 x 10. it will require eight minutes to enlarge to 16 x 20, etc.

The correct exposure must largely be a matter of experiment. We have found the time for enlarging on bromide paper on a bright day to double size, (note that 8 x 10 is four times the size of 4 x 5), varies with different negatives from about one and a half to two and a half minutes, enlarging from a 4 x 5 transparency to an 8 x 10 Carbutt 16 plate to take from forty to ninety seconds, with an f32 stop; to make lantern slides on a bright day to vary from two and a half to fifteen minutes, the latter extreme being from a very intense negative.*

In experiments, for the purpose of determining the correct time, it is not necessary to waste large plates or large sheets of bromide paper, as a small piece of the paper or a quarter plate will answer as well, to receive simply a portion of the enlargement.

In enlarging or reducing from a negative or transparency use the smallest stop; in enlarging from a picture or photograph use a medium size stop. In the latter case, if a small stop were used it would have the effect of showing too plainly the imperfections or grain of the paper.

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*As showing how great may be the difference between a bright day in summer and a cloudy day in winter, notice the following experiments which the writer tried on a dull, cloudy day in February, this year: To ascertain the time required to enlarge from a 4 x 5 to 8 x 10 on a 16 sens. plate, he exposed first for five minutes, then ten, fifteen and twenty minutes, and the latter was found to be the correct time, a stop f45.2 being used.

CHAPTER XIX.

ORNAMENTAL PHOTOGRAPHY.

THERE is scarcely any limit to the different ways in which photography can be applied ornamentally. Photographs on watches, on handkerchiefs, on collars and various articles of that description; photographs on china ware, glass ware, and in fact photographs on every thing. We wish to describe only one or two processes and leave it to the ingenuity and patience of the student to apply the same in other directions. To our mind, one of the prettiest ways in which the camera can be made useful, is to photograph a bit of landscape, or a head, or a small group on letter paper. For this purpose we can use any paper suitable for making blue prints, or the plain salted paper. Let us first make some blue prints on letter paper. Suppose we take a sheet of folio paper of good weight, the same kind that we use for our best blue prints, and cut the sheet into quarter size. The size of folio paper is 17 x 22 inches, and a quarter would therefore be 8½ x 11 inches. Now if we fold one of these quarters to make a four page sheet of note paper, the size would be when folded 5½ x 8½ inches. We do not need, however, for our present purpose to fold the paper, but merely to make a short crease in it, in the center of one side, which is merely to show where the paper will be folded after it is finished. This crease is merely a guide for us to show where we are to sensitize the paper with

our blue solution. We mark a number of sheets in this way. We then prepare a few drams of our solution as described in the chapter on blue prints, and apply it with our sponge. To lay this on, it is only necessary to swab in one direction the part of the paper on which we wish to print, and we do this either in the upper left-hand corner, or the right-hand corner, or in the upper center, or across the whole of the top. If we wish the picture in

the upper left-hand corner when folded, and we know about the size of the picture, we lay on enough of the solution to surely cover all of the space where the picture is to go, being careful to brush near the crease, which, when folded will be the left-hand and the upper edge of the paper. After the solution is applied, it is not necessary to hang up the paper to dry, but it can be laid on a table or newspaper, or anything of that kind, where it will dry in a few minutes. When it is dry, the paper

should be neatly folded along the line of the crease which we have previously made, and laid away in a dark box, till wanted for use.

Now for the printing. For this purpose it is better to use what are called vignette papers,* sets of which are for sale by all dealers. We take our printing-frame, and lay in it a sheet of plain glass (and for this purpose we need to use a frame at least as large as 8 x 10); then, having selected our negative from which we wish to print, say a head or small figure on our paper, we select a vignette paper which will just take in this head, and place the negative in the frame, face up with the vignette paper underneath; then, with some strips of opaque paper, we cover all of the negative which we do not wish to use. The object of this is to prevent any impression being made on the small, sensitized portions of the note paper, which may happen to fall outside of our vignette paper. It will be seen, of course, that the negative must be so placed that it will be held in position by both halves of the back of printing-frame, so that it will not be moved from its place when the frame is partly opened to examine how the printing is progressing. After this, we very carefully lay our folded paper in position on the negative, so that the head will come in the corner of the paper where we wish it to be printed. We close the frame and set it in the sunshine to print. As we are printing through the vignette paper, the time required may be about twice as long as we should give for ordinary blue prints. When it has printed sufficiently, we take out the paper and develop it in water in the usual way and hang up to dry, and when it is nearly dry the paper should be placed between sheets of smooth blotting paper and put in a press, or under heavy pressure, where it will dry perfectly smooth.

*See illustration, opposite page.

To make purple or black prints on note paper, we use the same size paper as we have just described, and salt it as described in the chapter on plain salted paper, and with our silver solution we sensitize simply that part of the paper on which we wish to print, and print on this with vignette paper as described above. The prints can then be washed and toned and fixed in the same way as prints on regular salted paper, and, after being washed and dried, pressed to shape. When this is neatly done, the result will be very gratifying and beautiful.

We give an illustration of a sheet of note paper prepared in the manner described, which is not as fine or delicate as the amateur can make for himself.

We know a young photographer who uses his camera in this way to decorate and illustrate his compositions at school.

Another one who photographs his little sister's head on the corner of her invitation cards for an occasional party.

With these hints an ingenious amateur will think of a multitude of ways in which he can make his camera a delight.

One other idea, before we close this chapter. In engravings and etchings we have "proofs before letters," "artists' proofs," and "remarque proofs." We wish to show how the young photographer can make of his prints one of these, "remarque proofs." We will turn back to chapter X, and take one of our prints, with broad margin on plain paper, before it has been washed or toned. These broad margins have not yet been exposed to the light, and can still be printed on, and under the lower right-hand corner of the picture we propose to print the head of the artist photographer, which we may probably find among the negatives in his collection. For this purpose we require one of our largest

printing-frames, ten by twelve, or eleven by fourteen inches. We use one of the smallest vignette papers, and place it under the negative on the glass in the frame as previously described in this chapter. We then have to cover with black paper all the glass in the frame, excepting the space for the vignetting, to prevent the light from reaching any other portions of our paper. When this is done we lay on the picture so that the head to be copied will come in the right place, and right side up, and expose to sunlight as before. After the printing is done, the prints will be ready to wash, tone and fix.

In our photo-gravure of a "remarque proof" it was not found convenient to vignette the small head. This picture, "On Nippersink Creek," and the example of note paper, were made from negatives which were entirely the work of a young lad, with a cheap camera, after a few months' experience. They are not intended as illustrations of fine photography, but simply to make more intelligible what we have tried to explain.

CHAPTER XX.

GENERAL HINTS.

IT is well for the amateur to accustom himself to standing on either side of the camera in taking views. This is a matter that may seem to be of trifling importance, yet it is not a good plan to "get into the rut" of always taking one position when preparing to uncap the lens, or removing the slide, otherwise mistakes may occur. Elsewhere we have advised a fixed habit of invariably taking plates from developer and fixer and washing in the same manner, but it is different in using the camera in the field. One illustration will show the force of this.

Two amateurs, whom we will call James and John, of considerable experience, were tramping for views along the bank of a picturesque stream, and both hit upon the same spot, a scene of rare beauty. The bank was high and steep, and James planted his camera close by the water's edge, while John placed his a few feet behind and about ten feet above him where the bank overhung the stream. They adjusted their focuses, and, to make their exposures, were obliged, from the nature of the ground, to stand on the left of their cameras to withdraw their slides and remove the caps. The exposures were made, and John was replacing his slide when he suddenly shouted out "ha! ha!"

Immediately his companion looked up at him, and in a rather provoked tone said "What are you laughing at up there?"

"Well," said John, "I pulled out the back slide, and spoiled my plate."

"I did the same thing," said James, "and supposed you saw me and were laughing at my mistake. And the worst of it is that I spoiled one I had exposed already."

They had reversible-back cameras, and each one, unconsciously, pulled the back slide, as the side that was towards his right hand.

PLATE-HOLDERS.

If, after using a plate-holder for some time, signs of fog are detected in the plates and you suspect the plate-holder is not light-tight, you can glue a slip of velvet over the slit in the holder and when it is dry cut through the slit with a sharp knife. This will usually make the holder safe to use.

When filling plate-holders it is a good plan to make a pencil mark in one corner of the plate corresponding with the holder number. This is indispensable when one is going on a journey, intending to expose a goodly number of plates which may not be developed for some time afterwards. These marks will show plainly on the finished negative, and will serve to identify it, the number of the holder being entered in the record book.

TO FOCUS QUICKLY.

Set up the camera and focus on some object at a measured distance of twenty feet, and make a mark on the camera bed on a line with the front, with the figures 20 against it; do the same at 40, 60 and 100 feet. You will learn to judge these distances with sufficient accuracy, and, the distance being known, the

focus can at any time be found by moving the front to the required line. It will be convenient to do this on many occasions when there is not time to use the ground-glass. Objects beyond one hundred feet will lie in the same focus as at that distance.

MICROSCOPIC PHOTOGRAPHS.

To make a photograph of any object for use in the microscope the following arrangement is advised:

By the side of the object to be photographed, and exactly on the same plane with it, place some large letters which you can easily obtain from some large hand-bill, then take the camera far enough away until the letters are as small as they can be and yet clearly discernible on the ground-glass and accurately sharp and distinct. A magnifying glass, of course, should be used to examine the letters on the glass; at this distance the image of the object to be copied will probably be too small to be seen by the naked eye.

The exposure can be made in the regular way.

After developing, the negative should be examined with a microscope to see that the details are brought out distinct and clear, and from this negative a positive can easily be made for use in the microscope.

For suspending paper for drying, whether salted paper, sensitized paper, blue paper or soda blotting paper, in fact any paper

or print which does not curl, we know of nothing so handy and inexpensive as the ordinary spring clothes-pins.

These can be strung on tightly stretched cords in the dark-room or any place where they will not be in the way.

Formulas VI and VIII are excellent for bromide and photo-chloride paper. In using these we think the best plan is not to soak the paper in water before development (as is customary with the ferrous-oxalate), but to pour the solution on the dry paper laid in the tray. Wash well after development before fixing.

THE "DETECTIVE" CAMERA.

We have had and enjoyed most heartily a detective camera since they first came into use. We have used them on nearly every legitimate subject, and think we understand well their limitations. We say legitimate subject, because it is not uncommon for persons, who should know better, to use their detectives in a way tending to bring reproach upon amateur photographers. Whatever else it may be, it is certainly an unpardonable impertinence to take a picture of a stranger without permission, especially if that stranger be a lady. Be gentlemanly always, and respect the rights and feelings of others.

Very quick plates are essential for success with these cameras, and abundance of light. The spring and summer months are the best times of the year, as the light is so much stronger. The shutters of these cameras are usually adjusted to quick and slow movement. The clearest and sharpest pictures can generally be made with a small stop, and slow movement of the shutter, though for very fast moving objects the largest stop and quickest expos-

ure may be necessary. It is highly important, however, that at the moment of the exposure the camera should be held perfectly still. Therefore, for good work, the exposure should not be made in a hurry. In very shady places, under trees, there will not be light enough for good work, nor in cities where the light is obscured by smoke, unless in the direct sunlight. As with other cameras, in taking views of buildings, to prevent distortion, the box must be level.

Detectives are excellent for making views for lantern slides, especially if a quarter plate is used in a camera made for plates of a larger size. From a lantern slide made from such a plate an eight by ten negative can be made in an enlarging camera, showing all the details with great clearness.

For use on a journey, a good detective camera is invaluable. A trip to Alaska, through the Yosemite, a month on a Nile steamer, through Palestine and the Orient, a summer on foot through Switzerland,—what a wealth of illustration could we bring home with our detective! If there had only been such a thing twenty-five years ago!

All things considered, we think if we could have but a single camera we should certainly choose a detective; one that could also be used on a tripod. Do not waste money on cheap cameras here.

CHAPTER XXI.

RESIDUES.

If the amateur does considerable developing and printing he should save the following waste papers, water and baths; if he does but little with his camera, the slight saving will hardly be worth the trouble and time required: The clippings from paper or prints containing silver (before toning), such as albumen paper, plain, bromide and photo-chloride paper, and cotton brushes used for sensitizing plain paper. These should be carefully burned from time to time, as a sufficient quantity accumulates, on a clean shovel, or in an iron pan, and ashes saved.

The first two waters used for washing plain and albumen silver prints should be poured into an earthen glazed jar, and when this is nearly full, the water is to be acidified by adding muriatic acid. A saturated solution of common salt is then added (a small quantity will be sufficient), which will precipitate the silver to the bottom of the jar as chloride of silver. This should be allowed to stand until all the silver is down, when the water can nearly all be drawn off with a siphon, or carefully dipped out, care being taken not to stir up the silver. The chloride can then be scraped out and washed in clean water, and added to the ashes from the paper after drying.

A jar should also be kept to preserve old fixing baths. When this is nearly full, sulphuric acid is added to the solution to

acidify it, and the silver precipitated by the addition of a saturated solution of sulphide of potassium. This must be done in the open air, as the odor is very offensive. When the silver has all settled, the solution should be drawn off as before, and the deposit scraped up, washed and dried, and kept in a special box by itself.

When a considerable quantity of these residues has accumulated, it can be sent to a silver refiner for reduction. If the amateur wishes he can himself reduce the silver from the paper ashes and the wash-water residues in the following manner: We use for this purpose a small blacksmith's forge, which forms a part of an amateur work-shop. We take the ashes and wash-water residue, weigh them, and mix very carefully with twice their weight of sal soda, and a like weight of carbonate of potash. This mixture is then put in a crucible, which is placed in the forge and kept at a white heat till the mass is entirely liquid, after which it is allowed to cool. When cold, the crucible is broken, and out comes a small button of silver. It is well worth trying, and the small button will seem worth its weight in gold.

CHAPTER XXII.

FORMULAS.

IN all formulas given for solid measure we use avordupois weight, by which drugs and chemicals are usually sold. When an ounce is mentioned, solid measure, we mean 437½ grains. It would be well if all followed this rule, or any one rule, as it would lead to less confusion.

In formulas of Seed, Cramer and Blair, by one ounce is meant 480 grains; while Carbutt, Eastman, and some others use an ounce of 437½ grains.

I.

A RELIABLE HYDROCHINON DEVELOPER IN ONE SOLUTION.

Sulphite soda crystals,	500	grains,
Phosphate soda granular,	240	"
Carbonate soda crystals,	500	"

Water to make 16 ounces.

Dissolve and filter, and add hydrochinon, 100 grains.

When dissolved, filter once more. For instantaneous exposures, use full strength. For long exposures add from one to two ounces water to each three ounces of developer.

II.

HYDROCHINON DEVELOPER IN TWO SOLUTIONS.

No. 1.

Sulphite soda crystals, - 500 grains,
Phosphate soda granular, 120 "
Water to make - - 8 ounces,

Dissolve and filter, and add hydrochinon, 100 grains.
Filter again when dissolved.

No 2.

Carbonate soda crystals, - 500 grains,
Phosphate soda granular, 120 "
Water to make - - 8 ounces.

When dissolved, filter.

This is the same as the first formula, but put up in two solutions. It will keep fresh for at least a year in the dark room. It is more convenient to have it in this form, allowing the use of more or less of No. 1 as desired.

Use equal parts, reducing with water as before.

III.

ANOTHER GOOD HYDROCHINON DEVELOPER.

Sulphite soda crystals, 400 grains.
Carbonate soda, " 400 grains.
Water to make 8 ounces.
Dissolve and filter, and add
Hydrochinon, 60 grains.

For use take two ounces solution and add two ounces water.

IV.

STILL ANOTHER GOOD HYDROCHINON DEVELOPER IN TWO SOLUTIONS.

No. 1.

Sulphite soda crystals, 400 grains.
Water to make 4 ounces.
When dissolved and filtered, add
Hydrochinon, 60 grains,

No. 2.

Carbonate potassium, 200 grains.
Water to make 4 ounces.
Filter when dissolved.

For use take one ounce each of Nos. 1 and 2, and two ounces water. This is especially good for timed exposures.

We use it generally for copying.

All of these hydrochinon developers can be used repeatedly as long as they remain clear. After use they should be filtered into a separate clean bottle.

This old solution will not keep fresh in a partly filled bottle, as it is affected by the air. It should therefore be kept in a tightly corked bottle, which it will entirely fill. This should be observed always in preserving mixed developing solutions.

V.

HYDROCHINON DEVELOPER FOR INSTANTANEOUS EXPOSURES.

Sulphite soda crystals, 200 grains.

Carbonate soda crystals, 480 grains.

Water to make 8 ounces.

Dissolve and filter, and add

Hydrochinon, 50 grains.

For ordinary exposures use an old developer.

VI.

HYDROCHINON DEVELOPER, FOR LANTERN SLIDES AND TRANSPARENCIES.

No. 1.

Sulphite soda crystals, 500 grains.

Water to make 8 ounces.

Dissolve and filter, and add

Hydrochinon, 125 grains.

No. 2.

Carbonate potassium, 300 grains.

Water to make 8 ounces.

Filter when dissolved.

For use take one ounce each of Nos. 1 and 2, and from one to two ounces water.

While this developer is most excellent for lantern slides it is also equally good for bromides and photo-chloride prints. It is also an excellent developer for dry plates generally.

It can be used repeatedly as long as it remains clear.

VII.

HYDROCHINON DEVELOPER.

FOR UNDER-EXPOSED INSTANTANEOUS EXPOSURES.

No. 1.

Sulphite soda crystals, 200 grains.
Water to make 8 ounces.
Dissolve and filter, and add
Hydrochinon, 50 grains.

No. 2.

Carbonate potassium, 50 grains.
Caustic soda (sticks) 20 grains.
Water to make 1 ounce.

For use take two ounces No. 1 and one to two drams No. 2.

VIII.

ANOTHER HYDROCHINON DEVELOPER.

No. 1.

Sulphite soda crystals, 400 grains.
Water to make 6 ounces.
Dissolve and filter, and add
Hydrochinon, 50 grains.
Bromide potassium, 1 grain.

No. 2.

Caustic soda (sticks)80 grains.
Water to make 5 ounces.

If desired, an equal weight of caustic potash can be substituted for the caustic soda.

For use add to each 4 ounces of No. 1, 4½ drams No. 2.

After use, filter into a separate, clean bottle. This bottle should be washed clean every time before an old developer is filtered into it.

Use repeatedly as long as it remains clear, adding each time 30 drops of No. 1 and 6 drops No. 2.

This is an excellent developer for dry plates, and we have found it to work well, also, with bromide and photo-chloride paper.

IX.

EIKONOGEN DEVELOPER.

No. 1.

Sulphite soda crystals, 120 grains.
Water to make 8 ounces.

Dissolve and filter, and add

Eikonogen, 60 grains.

To dissolve thoroughly, the bottle containing above should be well shaken every few minutes, repeating this several times.

No. 2.

Carbonate potassium, 300 grains.
Water to make 4 ounces.

Filter when dissolved.

For use take three ounces No. 1 and one ounce No. 2.

X.

EIKONOGEN DEVELOPER FOR LANTERN SLIDES.

No. 1.

Sulphite soda crystals, 250 grains.
Water to make 8 ounces.
Dissolve and filter, and add
Eikonogen, 20 grains.

No. 2.

Carbonate potassium, 32 grains.
Water to make 1 ounce.

For use take two ounces No. 1 and one dram No. 2.

We have thoroughly tested this, and know it to be excellent.

XI.

A COMBINED EIKONOGEN AND HYDROCHINON DEVELOPER FOR LANTERN SLIDES.

No. 1.

Eikonogen, 48 grains.
Meta-bisulphite potassium, 48 grains.
Water to make 8 ounces.

When entirely dissolved, filter and add
Hydrochinon, 48 grains.

No. 2.

Carbonate potassium, 250 grains.
Carbonate soda crystals, 250 grains.
Yellow prussiate potash, 250 grains.
Water to make 8 ounces.

Filter when dissolved.

For use take one ounce No. 1, one ounce water, and forty drops No. 2. The image should make its appearance in about a minute. If it is slow in coming up, add a half dram of No. 2.

XII.

FERROUS-OXALATE DEVELOPER.

No. 1.

Neutral oxalate potassium, 960 grains.
Bromide potassium, 8 grains,
Hot water to make 8 ounces.

When dissolved and cold, add oxalic acid till it turns blue litmus paper red. Then filter.

No. 2.

Proto-sulphate iron, 240 grains.
Water to make 2 ounces.
Sulphuric acid, 2 drops.

Filter when dissolved.

For use pour one-half ounce No. 2 into two ounces No. 1.

In this developer the iron is the main factor, and for good results it should be kept fresh, dissolving only the quantity named at a time.

The oxalate solution should be filtered occasionally to keep it clear.

XIII.

SEED'S PYRO DEVELOPER.

Sulphite soda crystals, 72 grains.
Carbonate soda crystals, 48 grains.
Pyrogallic acid, 12 grains.
Water to make 4 ounces,
at temperature from 65 to 75 degrees.

This can be made from the stock solutions previously given, the pyro to be added dry.

XIV.

CRAMER'S PYRO DEVELOPER FOR COLD WEATHER.

Sulphite soda crystals, 180 grains.
Carbonate soda crystals, 45 grains.
Pyrogallic acid, 10 to 25 grains.
Sulphuric acid, 2 drops.
Water to make 4 ounces,
at temperature 65 to 70 degrees.

For hot weather.

Sulphite soda crystals, 90 grains.
Carbonate soda crystals, 22½ grains.
Pyrogallic acid, 10 to 20 grains.
Water to make 4 ounces,
and keep temperature under 60 degrees.

XV.

CRAMER'S LATEST PYRO DEVELOPER.

Sulphite soda crystals, 720 grains.
Carbonate soda crystals, 300 grains.
Bromide potassium, 15 grains.
Water to make 16 ounces.

To every ounce of this solution, add 4 grains dry pyrogallic acid.

XVI.

EASTMAN'S PYRO-AMMONIA DEVELOPER.

Pyrogallic acid, 3½ grains.
Sulphuric acid, 1 drop.
Concentrated ammonia, 8 drops.
Bromide potassium, ½ grain.
Water to make 4 ounces.

XVII.

PYRO DEVELOPER FOR INSTANTANEOUS EXPOSURES.

Sulphite soda crystals, 120 grains.
Carbonate Potash, 45 grains.
Bromide Potassium, 2½ grains.
Sulphuric acid, 2 drops.
Pyrogallic acid, 15 grains.
Water to make 4 ounces.

This is a good developer.

XVIII.

TONING BATHS—THE BORAX BATH.

Powdered Borax, 1 ounce.
Hot water 16 ounces.

When dissolved and cold, filter.

For use, take a sufficient quantity of above, add an equal quantity of water, and one grain chloride gold and sodium for each dozen 5 x 8 prints.

This can be used immediately.

XIX.

ACETATE OF SODA BATH.

Acetate of soda, 120 grains.
Chloride gold and sodium, 6 grains.
Water to make 32 ounces.

This should be made the day before wanted for use. It can be used several times, by returning the old solution to a separate bottle, adding each subsequent time about one-half dram of the stock gold solution. (See chapter on Toning).

There are numerous other toning baths, all of which give good results, but we think the above will be found sufficient for all albumen or plain silver prints. It must not be forgotten that a good negative is the most important factor in securing good results in toning, and thorough washing before placing the prints in the toning bath.

XX.

A SUBSTITUTE FOR GROUND GLASS can be made by dissolving in two ounces of commercial ether 90 grains gum sandarac and 20 grains gum mastic. When these are dissolved, add to the solution two ounces benzole. This must be kept in a tightly

corked bottle and not opened near a light or fire. To use it, gently heat the glass to be coated and apply the solution as below. Great care, however, must be taken to avoid letting the solution flow upon the film side of the plate.

Holding the plate by one corner between the thumb aud fore-finger, so that the thumb will hardly touch the top surface of the glass, pour on the solution in the center, till it covers a third or more of the plate, tilting it gently each way. When the solution has thus spread over the whole surface, let it drain back into the bottle from one corner. By standing the glass on edge, it will then dry in a few minutes. The illustrations were designed to show the operation of varnishing a plate (which is not necessary with dry plates), but they answer as well to show the above process.

XXI.

GUM FOR ADHESIVE PAPER.

Place in a half pint wide-mouth bottle

1 ounce alcohol,
5 ounces water,
1 ounce acetic acid,

And pour into this slowly

2 ounces dextrine.

Place this bottle in a basin of hot water, occasionally shaking it, till the dextrine is dissolved.

This can be spread on sheets of paper and will dry quickly. Such paper will be useful for making labels to paste on bottles, or small strips to number negatives.

XXII.

ANOTHER GUM

for the same purpose can be made by boiling in six ounces of water

60 grains gum arabic,
60 grains laundry starch,
1 ounce white sugar.

If ordinary mounting cards are coated with this and allowed to dry, wet prints will adhere to them by pressing them with clean sheets of blotting paper to take up the surplus moisture.

XXIII.

TO PREPARE RUBY GLASS.

Dissolve in two ounces of hot water,
50 grains sheet gelatine,
1 grain chloride ammonium,
When this is cold, add a solution of
Nitrate silver, 10 grains,
Water, 1 dram.

The glass, after being thoroughly cleaned, should be warmed, and upon this flow enough of the solution, warmed to about blood heat, to cover the surface. The glass should then be laid on a level shelf for the solution to set and dry. When this is afterwards exposed to the sunlight, the color will change to an orange ruby, suitable for use in a dark-lantern.

XXIV.

A BLACK VARNISH

for coating the inside of lens tubes, plate-holders, cameras, etc., can be made by dissolving

300 grains gum sandarac,
20 grains gum camphor,
in 2 ounces alcohol,

And adding a sufficient quantity of lamp black. Apply with a fine brush.

XXV.

TO INTENSIFY NEGATIVES.

No. 1.

Bichloride mercury, 240 grains,
Chloride ammonium, 240 grains.
Distilled water, 20 ounces.

No. 2.

Chloride ammonium, 480 grains.
Water, 20 ounces.

No. 3.

Sulphite soda crystals, 480 grains.
Water, 10 oz.

The negative to be intensified, should be soaked in cold water for fifteen minutes, and then, after pouring off the water,

flow over it sufficient of No. 1 to cover it, and allow the film to either partially or entirely whiten; the longer this is allowed to act, the more intense will be the result. When sufficiently whitened, pour off the solution into the sink, and flow over the plate some of No. 2, allowing it to act one minute; then wash off, and pour over or immerse in No. 3, until changed entirely to a dark brown or black. No. 3 can be returned to its bottle, but the used portions of Nos. 1 and 2 had better be thrown away. After the last operation, wash the plate thoroughly and dry.

We are indebted to Mr. Carbutt for the above.

To intensify locally, use "Hall's intensifier" (for sale by dealers). This should be applied very carefully with a brush. It will bring out details in shaded parts.

Local intensifying can also be done mechanically by applying indigo blue with the finger to the glass side of negatives, moistening the color with gum-water. This will intensify enough to lighten deep shadows.

XXVI.

TO REDUCE NEGATIVES.

Bichromate potassium, 60 grains.
Muriatic acid, 1 dram.
Water, 6 ounces.

Lay the plate in water for a few minutes, and transfer to the above till the reduction is sufficient, after which wash the plate thoroughly.

This can also be applied with a fine brush to parts requiring local reduction.

XXVII.

TO REDUCE LOCALLY.

Prepare a solution of

Hyposulphite soda, 35 grains.
Red prussiate potash, 5 grains.
Water, 4 ounces.

Apply this carefully to parts needing reduction, with a fine, soft brush, after soaking the plate ten minutes in water to soften the film. Wash the plate and repeat, if necessary.

We have seen portrait negatives, in which the face was so intense as to require prolonged exposure in sunlight to bring out any detail, which were successfully reduced in the above way.

XXVIII.

FARMER'S SOLUTION FOR REDUCTION.

No. 1.

Hyposulphite soda, 1 ounce.
Water, 16 ounces.

No. 2.

Red prussiate potash, 55 grains.
Water, 2 ounces.

For use add one half dram No. 2 to each ounce of No. 1. The negative is immersed in the solution, and as the high lights are attacked first they may be effectually reduced before the shadows are touched. The larger the quantity of No. 2 used, the more

rapid will be the reduction. To reduce locally, apply the mixed solution with a soft brush to the particular parts. Wash plate well after these operations.

This same solution may be used to reduce over-printed photographs on paper without affecting the tone in the least.

XXIX.

LOCAL REDUCTION.

If any parts of a negative show in printing too great intensity, they can be reduced by soaking for ten minutes in cool water, and then applying a weak solution of chloride of lime to the parts till sufficiently reduced. During this process the negative should be kept wet, and afterwards thoroughly washed. Some photographers rub the parts with the finger wet with the lime solution, but an unskilled hand is liable, in doing this, to injure the film. If the intensity is noticed during development it can be reduced by applying the lime as above, after fixing and washing.

TIN DEVELOPING DISHES.

These can be coated with a quick-drying asphalt varnish, the same kind as is used on bicycles.

IN REGARD TO GLUE.

Glue, with a small percentage of glycerine added, adheres to metals. A small amount of molasses added to glue will act in the same way.

Tannin added to glue makes it strong and adherent. Carbonate of potash renders glue water proof.

REMOVING FILMS FROM OLD NEGATIVES.

To remove gelatine films from plates, our practice is to soak them in a basin of hot water, which loosens the films so that they easily peel off.

INDEX.

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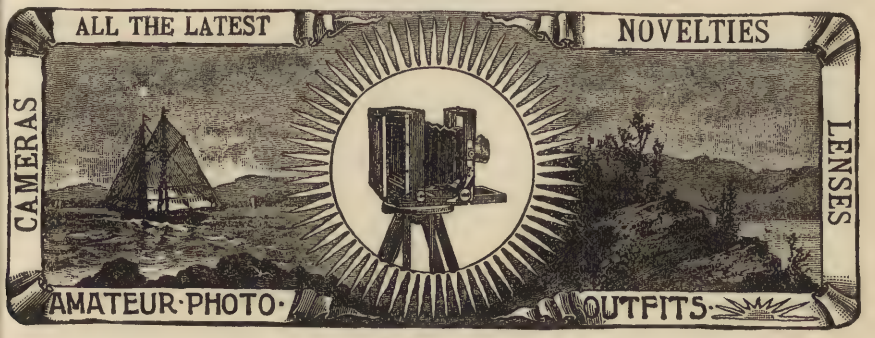

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It consists of Polished Hardwood Camera with Folding Bed, Double Plate Holder, Fine Brass Mounted Lens with set of Stops, Folding Tripod, Carrying Case, Printing Frame, and Complete Chemical Outfit.

One Specimen Photograph made with No. 3 Outfit, by mail on receipt of 10c.

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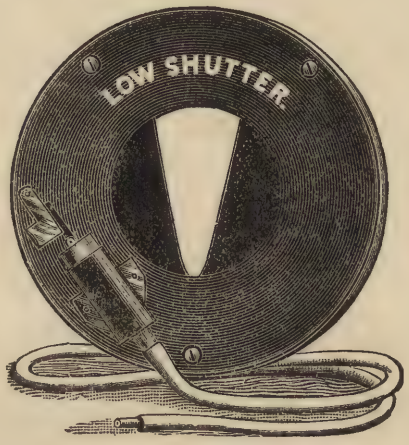
THE LOW
Photographic Shutters



are made in five styles and twenty-two sizes. Are designed to make

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To those who desire a good, practical Shutter for gallery or out door work, we can honestly recommend the LOW SHUTTER.

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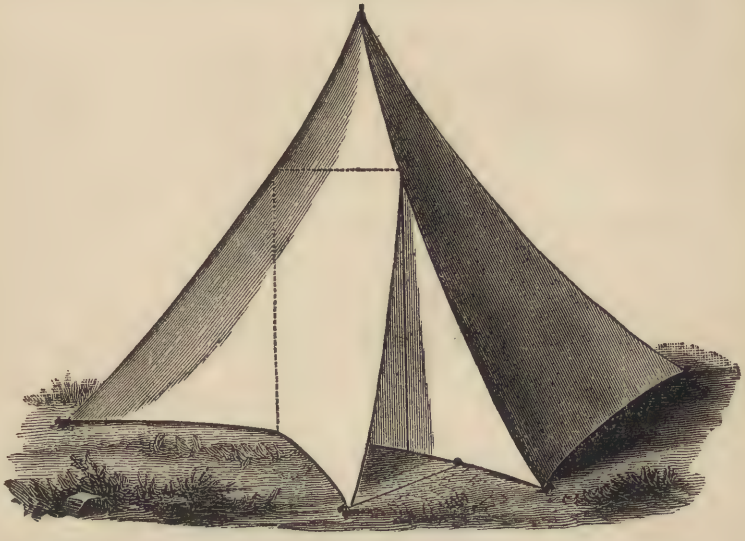
* FOR *

Photographers, Fishermen and Hunters

ON CAMPING EXCURSIONS.

CLARK'S PORTABLE TENT.



Made of 8-ounce duck, with 9-inch sod cloth and water-tight flap, as shown in illustration. Ground size, 7 x 7 feet; height, 7 feet. Price, with 7 foot, 1½ inch diameter, three-joint pole, and tent pins $7.50

Weight of Tent, jointed pole and tent pins, 15 pounds.

BUNDLE AND SHOULDER STRAP.

Illustration shows Angler's Portable Tent folded with Floor Cloth. Heavy and durable Bundle and Shoulder Strap. Weight of outfit, complete, 21 pounds. Price of Bundle and Shoulder Straps.... $1.50

Price of complete outfit—Tent, Three-jointed Pole, Tent Pins, 7x7 ft. 10-oz. Waterproof Floor Cloth, Bundle and Shoulder Straps $13.00

Description of Floor Cloth on opposite page.

— MANUFACTURED AND FOR SALE BY —

THE JOHN WILKINSON CO.,

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FOR

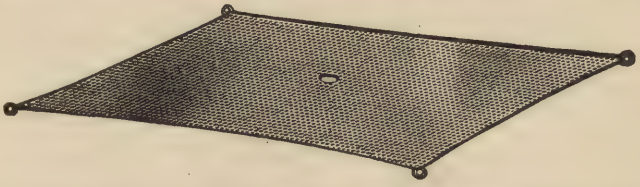
Photographers, Fishermen and Hunters

ON CAMPING EXCURSIONS.

WATER-PROOF FLOOR CLOTH

See Opposite Page.

FOR CLARK'S PORTABLE TENT.



Made of 10-ounce water-proof duck, dead grass color, with straps and buckles on each corner to fasten to the four corner tent pins. Size of Floor Cloth, 7x7 feet. Price, each $4.00

Weight of Floor Cloth, 5 pounds.

CLARK'S CAMP COOKING UTENSIL OUTFIT,

CONTAINING:

One Double Thick Sheet Iron Dutch Oven.
One Double Thick Sheet Iron Frying Pan.
One Double Thick Sheet Iron Stew Pan with Cover.
One 22-inch Adjustable Handle, jointed in centre, fitting either frying pan or stew pan.
One Seamless Coffee Pot, holding three pints
One Block Tin Pail with Cover, holding three quarts.
One Sheet Iron Kettle with Cover, holding four quarts.

Four Enameled Ware Cups.
Four Enameled Ware Plates.
Two Enameled Ware Dishes, for Fish, Meat or Vegetables.
Four Plated Tea Spoons.
Two Plated Table Spoons.
Four Steel Knives,
Four Steel Forks.
One Salt-cellar.
One Pepper Box.

Complete Outfit put up in durable Canvas Bag with Shoulder Strap as shown in illustration.

Dimensions:

9 inches in diameter,
12 inches high,
Weight 14 pounds,
Price complete, $12.00.

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